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## Optimizing Effect Of Static Exercises On Muscle Tone Of The Paravertebral Zone.

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### ABSTRACT

High physical activity is an important component of strengthening the musculoskeletal system and preventing many diseases. It inhibits the pathological processes of different localization, activates protein synthesis in muscles, nervous and immune systems. Currently, special popularity enjoys gymnastics, including static exercises with a passive deflection. In the study, it was revealed that during the execution of these exercises, there was a decrease in the tone of paravertebral muscles in the cervical and thoracic areas. In these conditions, spinal traction is accompanied by some smoothing of vertebral bends, the trunk is held more straight, the chest kyphosis is not allowed to grow, the neck stretches, more clearly continuing the line of the trunk. High efficiency allows you to recommend static exercises with a passive deflection to a wide application if you need to reduce the tone of the paravertebral muscles. This category of exercises with a relaxing effect on paravertebral muscles can be in demand in programs of kinesitherapy in the prevention of osteochondrosis and diseases of large joints, accompanied by an increased tone of paravertebral muscles. As a result of spinal column stretching, the tone of the muscles of the trunk that participate in breathing is optimized. This effect promotes rapid normalization of metabolic processes throughout the body of the trainee.

**Keywords:** physical exercises, static load, passive deflections, myofasciography, muscle tone, paravertebral musculature.

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## INTRODUCTION

Maintaining a healthy lifestyle always positively affects the quality and life expectancy, which has been repeatedly noted in many scientific works [1,2,3]. Physical activity, being one of the main components of a healthy lifestyle, contributes to strengthening the musculoskeletal system and preventing diseases [4,5,6]. It is able to inhibit the pathological processes of different localization [7,8], to activate protein synthesis in muscles, nervous and immune systems [9,10,11]. This is able to ensure the strengthening of general resistance and the greatest possible reduction in the manifestations of the disease [12], and in some cases ensure complete recovery [13]. According to previous studies, physical exercises have great health potential in relation to all systems of the organism [14,15].

Integrative processes in modern society inevitably lead to increased public attention to their health [16,17]. At the same time, among the variety of types of physical culture, health gymnastics, including static exercises with a passive deflection [18] and having a great healing potential [19,20], is becoming very popular. According to the available statistics, about 14 million Russians over 16 years of age (approximately 2.3% of the total adult population of the country) perform such exercises. Of these, more than half plan to study them in more depth to become further instructors in their application [21].

A detailed analysis of available literature sources on this topic has made it possible to comprehend the high efficiency of using this category of exercises due to their high health potential [22].

**Purpose:** to determine the effect of regular performance of static exercises with passive deflection on the tone of paravertebral muscles.

## MATERIALS AND METHODS

The study was approved by the local ethics committee of the Russian State Social University on September 15, 2016 (protocol №9). The research was conducted on the basis of the Russian State Social University.

We examined 48 women who regularly performed 5 times a week static exercises, including a passive deflection in the thoracic spine.

The diagnostic method of myofasciography was used in the work (Patent for invention № 2424766 "Method for diagnosing the functional state of the muscles of the segments of the spine"), which allows you to quickly assess the tone of the paravertebral muscles and provide the result in a convenient visual form.

For the study, the following groups were formed: a control group (25 women 25-40 years old, less than 3 months of gymnastics), an experimental group (23 women 25-40 years old, more than 2 years of training). Measurement of the tone of paravertebral muscles was performed twice: sitting on a chair in a state of rest until the exercise and at the time of execution of the pose.

As an exercise, an exercise was chosen, representing an inclination forward from the standing position. During the exercise, the devices (plastic blocks) were used to adapt the exercise to any level of physical fitness for those involved. Strictly observed methodical recommendation for the exercise - stretch the spine and relax the muscles of the back. Extension of the spine suggested some straightening with smoothing of vertebral bends. The forward slope was carried out, mainly, due to flexion in the hip joints. The body should have been straight, not allowing the strengthening of the thoracic kyphosis. The neck stretched, continuing the line of the trunk. The vertebral column was stretched using the upper and lower limbs as a support, bending in the thoracic spine, which helped to relax the deep and superficial muscles of the back [23]. The processing of the numerical results of the study was carried out using the T Wilcoxon test method.

## RESULTS OF INVESTIGATION AND DISCUSSION

During the study in the control group, the focus was on the depth of slope. The task was to execute the slope as deeply as possible, putting his hands on the floor with his hands. The forward tilt was carried out by flexion in the hip joints and by strengthening the thoracic kyphosis.

Visually, there was a marked increase in the tone of the paravertebral musculature in the cervical and thoracic spine. The numerical values of the measurement results, expressed in conventional units, characterizing the tone of the paravertebral musculature in the control group, were statistically processed using the T Wilcoxon test: table 1 (cervical section), 2 (thoracic region).

**Table 1. Neck department (control group)**

Participant	Neck				
	before	after	shift	absolute value	rank
1	-11.95	-6.70	5.25	5.25	6
2	-17.57	-17.00	0.57	0.57	1
3	8.61	5.20	-3.41	3.41	4
4	-12.10	-9.60	2.50	2.50	3
5	-5.59	-15.50	-9.91	9.91	7
6	-12.84	-14.40	-1.56	1.56	2
7	-6.08	-39.10	-33.02	33.02	9
8	-4.96	-9.00	-4.04	4.04	5
9	-19.06	-8.50	10.56	10.56	8

A non-typical shift is an increase in the value (highlighted in blue). The sum of the ranks of the atypical shift is 18. Since  $T_{amp} > 0.05$  and is in the zone of insignificance, the  $H_0$  hypothesis about the presence of similarity is accepted. The shear intensity in the typical direction does not exceed the intensity of the shifts in the atypical direction.

**Table 2. Thoracic department (control group)**

Participant	Thoracic department				
	before	after	shift	absolute value	rank
1	-7,88	-5,90	1,98	1,98	5
2	-3,72	-3,40	0,32	0,32	3
3	13,50	13,20	-0,30	0,30	1,5
4	-1,24	0,00	1,24	1,24	4
5	-0,48	-3,20	-2,72	2,72	6
6	5,10	-3,50	-8,60	8,60	8
7	-0,98	-12,60	-11,62	11,62	9
8	6,80	7,10	0,30	0,30	1,5
9	-0,11	-3,20	-3,09	3,09	7

A non-typical shift is an increase in the value (highlighted in blue). The sum of the ranks of an atypical shift 13.5. Since  $T_{amp} > 0.05$  and is in the zone of insignificance, the hypothesis But about the presence of similarity is accepted. The shear intensity in the typical direction does not exceed the intensity of the shifts in the atypical direction.

In the experimental group, the main attention was paid to the methodically correct execution of the exercise [23]. Visually, there was a marked decrease in the tone of the paravertebral musculature in the cervical and thoracic spine.

The numerical values of the measurement results, expressed in conventional units, characterizing the tone of the paravertebral musculature in the experimental group, were statistically processed using the T Wilcoxon test: Table 3 (cervical spine) and tab. 4 (thoracic department).

**Table 3. Neck department (experimental group)**

Participant	Neck department				
	before	after	shift	absolute, value	rank
1	1,00	-17,00	-18,00	18,00	11
2	0,91	-1,30	-2,21	2,21	3
3	6,95	0,30	-6,65	6,65	9
4	-13,90	-18,10	-4,20	4,20	5
5	-6,60	-29,10	-22,50	22,50	12
6	-2,60	-9,20	-6,60	6,60	8
7	-11,00	-16,00	-5,00	5,00	6
8	-14,90	-29,10	-14,20	14,20	10
9	-4,50	-8,20	-3,70	3,70	4
10	-12,10	-14,00	-1,90	1,90	2
11	-7,70	-13,20	-5,50	5,50	7
12	-17,00	-16,80	0,20	0,20	1

A non-typical shift is an increase in the value (highlighted in blue). The sum of the ranks of the atypical shift 1. Since  $TEMP < 0.01$  and is in the zone of significance, the hypothesis H1 of the existence of a difference is accepted. The intensity of the shifts in the typical direction exceeds the intensity of the shifts in the atypical direction.

**Table 4. Thoracic department (experimental group)**

participant	thoracic department				
	before	after	shift	absolute value	rank
1	13,50	-0,10	-13,60	13,60	11
2	6,00	4,50	-1,50	1,50	1
3	11,60	-3,60	-15,20	15,20	12
4	-0,10	-7,60	-7,50	7,50	8
5	-0,50	-3,90	-3,40	3,40	2,5
6	0,60	-8,50	-9,10	9,10	9
7	-1,70	4,80	6,50	6,50	7
8	11,70	-0,80	-12,50	12,50	10
9	1,90	-2,10	-4,00	4,00	5
10	-3,60	-7,00	-3,40	3,40	2,5
11	-2,90	-7,20	-4,30	4,30	6
12	1,00	4,90	3,90	3,90	4

A non-typical shift is an increase in the value (highlighted in blue). The sum of the ranks of the atypical shift 11. Since  $0.05 > TEMP > 0.01$  and is in the zone of uncertainty, we accept H1 hypothesis about the existence of a difference with confidence within 5% of significance. The intensity of the shifts in the typical direction exceeds the intensity of the shifts in the atypical direction with a confidence level of 5%.

**CONCLUSION**

When performing exercises with a passive deflection in the experimental group, there was a decrease in the tone of paravertebral muscles in the cervical and thoracic spine. Based on the results of the work, it was possible to recommend static exercises with a passive deflection to active use to reduce the tone of

paravertebral muscles in the upper half of the spinal column. These exercises can be used in physical education classes to obtain a health and therapeutic effect. The use of these exercises can be claimed in programs of kinesiotherapy, for the prevention of osteochondrosis and other diseases of the musculoskeletal system associated with an increased tone of paravertebral muscles. To obtain the most pronounced clinical effect, it is necessary to have a clear methodical implementation of the exercise. So, in the course of the exercise, the forward slope should be performed by flexing into the hip joints, the trunk should be kept straight and not allowed to strengthen the thoracic kyphosis. At the same time, the neck needs to be stretched, thereby continuing the line of the trunk. As a result, the spinal column is stretched and flexes in the thoracic spine. The coming changes provide in all cases a relaxation of the deep and superficial muscles of the back.

#### REFERENCES

- [1] Zavalishina SYu, Nagibina EV. (2012) Dynamics of microrheology characteristics of erythrocyte in children 7-8 years with scoliosis with therapeutic physical training and massage. *Technologies of Living Systems*. 9(4) : 29-34.
- [2] Skorjatina IA. (2018) Therapeutic Possibilities Of Rosuvastatin In The Medical Complex In Relation To Disaggregation Vascular Control Over Erythrocytes In Persons With Arterial Hypertension And Dyslipidemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 977-983.
- [3] Bikbulatova AA. (2018) Restoration Of Microcirculatory Processes In Persons Of The Second Mature Age With Osteochondrosis Of Lumbar Spine In The Course Of Daily Wearing Of Medicinal Prophylactic Clothes For Half A Year. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 620-630.
- [4] Bikbulatova AA. (2018) Comparative analysis of rehabilitation efficiency in persons of the second mature age with spinal column osteochondrosis with the help of regular medicinal physical trainings and daily wearing of medicinal prophylactic clothes. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2018; 9(2) : 997-1007.
- [5] Bikbulatova AA. (2018) The Impact of Daily Wearing of Medicinal-Prophylactic Clothes on The Evidence of Clinical Manifestations of Osteochondrosis Of The 2nd Degree and Platelet Activity in Persons Of The Second Mature Age. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(1) : 677-683.
- [6] Vatnikov YuA, Zavalishina SYu, Kulikov EV, Vilkovysky IF, Nikishov AA. (2017) Correctional abilities of regular muscle activity in relation to erythrocytes' microrheological features of rats with experimentally developed hypertension. *Bali Medical Journal*. 2017;6(3):449-456. doi:10.15562/bmj.v6i3.586
- [7] Vatnikov YuA, Zavalishina SYu, Pliushchikov VG, Kuznetsov VI, Seleznev SB. (2017) Early-changes diagnostics of erythrocytes microrheological features in the model of dyslipidemia development in rats at the late stages of ontogenesis. *Bali Medical Journal*. 6(1): 216-222. doi:10.15562/bmj.v6i1.483
- [8] Skoryatina IA, Zavalishina SYu. (2017) Ability to aggregation of basic regular blood elements of patients with hypertension and dyslipidemia receiving non-medication and simvastatin. *Bali Medical Journal*. 6(3) : 514-520. doi:10.15562/bmj.v6i3.553
- [9] Bikbulatova AA. (2018) The Impact Of Medicinal-Prophylactic Trousers' Daily Wearing On Pregnancy Course In The Third Term Of Women With Habitual Miscarriage Of Fetus. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 663-671.
- [10] Bikbulatova AA. (2018) Formation Of Psychological Comfort In Women With Habitual Miscarriage Of Pregnancy Against The Background Of Their Daily Wearing Of Medicinal Prophylactic Trousers. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 1417-1427.
- [11] Vorobyeva NV, Skripleva EV, Makurina ON, Mal GS. (2018) Physiological Reaction of The Ability of Erythrocytes to Aggregate to Cessation of Prolonged Hypodynamia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 389-395.
- [12] Kotova OV, Zavalishina SYu, Makurina ON, Kiperman YaV, Savchenko AP. (2017) Impact estimation of long regular exercise on hemostasis and blood rheological features of patients with incipient hypertension. *Bali Medical Journal*. 6(3) : 514-520. doi:10.15562/bmj.v6i3.552
- [13] Skripleva EV, Vorobyeva NV, Kiperman YaV, Kotova OV, Zatsepin VI, Ukolova GB. (2018) The Effect Of Metered Exercise On Platelet Activity In Adolescents. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 1150-1154.

- [14] Bikbulatova AA, Karplyuk AA, Parshin GN, Dzhafar-Zade DA, Serebryakov AG. (2018) Technique for Measuring Vocational Interests and Inclinations in High-School Students with Disabilities. *Psikhologicheskaya nauka i obrazovanie-psychological science and education*. 23(2) : 50-58. doi: 10.17759/pse.2018230206
- [15] Apanasyuk LA, Soldatov AA. (2017) Socio-Psychological Conditions for Optimizing Intercultural Interaction in the Educational Space of the University. *Scientific Notes of Russian State Social University*. 16(5-144) : 143-150. doi: 10.17922/2071-5323-2017-16-5-143-150
- [16] Maloletko AN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. *Contemporary problems of social work*. 3 (3-11) : 4-5.
- [17] Pozdnyakova ML, Soldatov AA. (2017) The Essential and Forms of the Approaches to Control the Documents Execution. 3 (1-9): 39-46. doi: 10.17922/2412-5466-2017-3-1-39-46.
- [18] Zavalishina SYu, Vatnikov YuA, Kulikov EV, Yagnikov SA, Karamyan AS. (2017) Diagnostics of erythrocytes' microrheological features and early abnormalities of rats in the model of experimental hypertension development. *Bali Medical Journal*. 6(3) : 470-475. doi:10.15562/bmj.v6i3.589
- [19] Glagoleva TI. (2017) Physiological features of vascular control over aggregation processes in the blood of repair heifers on the growth. *Zootekniya*. 5 : 14-16.
- [20] Glagoleva TI. (2015) Vascular disaggregation control of major blood elements at calves on lacto-vegetable feeding. *Zootekniya*. 5 : 22-24.
- [21] Ivanova OV. (2009) A technique of curative gymnastics for children of 11-13 years having thoracic scoliosis of 2 degrees, on the basis of means, methods and internal technics of hatha-yoga: the author's abstract of the dissertation of the candidate of pedagogical sciences. Moscow, 25.
- [22] Samsonov EP. (2010) Complex physical culture and health-improving employment on the basis of fitness-yoga with women of middle age: 30-40 years: the author's abstract of the dissertation of the candidate of pedagogical sciences. Smolensk, 20.
- [23] Iyengar BKS. (2015) Yoga of Deepika. Clarification of yoga. Moscow, 496.