

Dynamics of the Functional State of Pregnant Students at the Institution of Higher Education

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Abstract

*One of the most pressing problems of higher education institutions is a sports and recreation activities in the discipline of (Physical Education) with students of full-time education in the field of unsportsmanlike profile to suit different trimesters of pregnancy. The purpose of this article is to analysis of changes in the functional parameters of the body of pregnant students as a result of special training set of physical exercises in the institution of higher education, in accordance with the program of extracurricular activities on the subject Physical Education in the School of the future mother. **Material and Methods:** To achieve this goal on the basis of the educational establishment (Vitebsk State University named after P.M. Masherova) within the framework of the School of future mothers, we held sports and recreation activities with pregnant female students for the first time organized in the framework of pedagogical experiment. **Methods:** Pedagogical experiment, methods of mathematical statistics. **Findings and their Discussion:** The article contains the results of functional changes occur in the body of pregnant students under the influence of exercise in the framework of the School of future mothers. Classes are special physical exercises which help to strengthen the muscles of the body, especially the muscles of the back. Increases joint mobility of the pelvis and spine. During the lessons students learn skills breathing during labor to increase the oxygen supply of the fetus and proper breathing during labor. **Conclusion:** The introduction in the educational process methods of fitness training (School of future mothers) for students of the second and third trimester of full-time education for unsportsmanlike specialties in an institution of higher education, in accordance with the program of extracurricular activities on the subject (Physical Education) confirmed its efficiency. It was found that regular classes with pregnant female students have a positive effect on heart rate and blood pressure, which help to increase lung capacity and dynamometer.*

Keywords: Physical education; Exercise; Pregnant students; Trimesters of pregnancy; Functional changes; and School of future mothers.

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1. Introduction

In the Republic of Belarus, as well as in other developed countries, there are demographic threats: unfavorable age structure of the population is associated, first of all, with the aging of the population; a decrease in the number of marriages, a low birth rate, as a result of which the number of citizens is not replenished, an insufficiently high life expectancy; reduction of the rural population.

The main reason for depopulation in the Republic of Belarus is the low birth rate, which ensures population reproduction by only 65%. In 2019, the total fertility rate was 1.49 per woman, with 2.15 required for simple reproduction of the population.

The health of the population, including pregnant women, is an important factor influencing the mortality rate in the country. Currently, in the Republic of Belarus, the incidence rate is growing among all groups of the population, age parameters are changing, and the proportion of people with chronic diseases is increasing [1,2].

The level of morbidity among pregnant women is extremely high - over 70% of women have a complicated course of pregnancy, which affects their fertility and, subsequently, the health of children. Maintaining the health of pregnant women is the most pressing problem of the state. Today, one of the important social problems is the state of health of women and their offspring. In the context of the demographic crisis in the country, preserving the health of pregnant women, in particular female students, is an important state task. Currently, complications during pregnancy is one of the most pressing problems [3,4].

Physical culture in higher education institutions (HEI) is presented as an academic discipline and a complex component of the holistic development of the personality of people, the significance of which is manifested through the harmonization of spiritual and physical forces; the formation of such universal human values as health promotion, physical and mental well-being, physical perfection; professionally applied, sports readiness, etc. The lack of significant positive dynamics of natural population growth is largely due to a deterioration in health, an increase in the number of gynecological diseases and a low level of psychophysical potential of the health status of the female population.

The negative situation is aggravated by the loss of cultural values in the public consciousness, the formation of a new style of girls' sexual behavior, as well as increasing physical inactivity, smoking, alcohol consumption, that is, risk factors that negatively affect the physical condition, and especially the psychophysical potential of the health status of female students [5].

In this regard, the question arises of taking into account in the process of physical education the anatomical and physiological characteristics of the female body and its biological functions of motherhood. It is necessary to create conditions for the birth of a healthy child. The program for the discipline (Physical culture) provides for a variable component, which is supposed to be filled with content in order to attract female students with different trimesters of pregnancy to physical education in the process of studying at a higher education institution. This will prepare the body

of the expectant mother for childbirth, and also relieve the teacher from the need to certify the student only in terms of theoretical knowledge. Physical exercises are shown to all female students with normal pregnancy [6,7].

Exercise for pregnant women is a powerful means of influencing the body of a healthy pregnant student. The correct use of even simple physical exercises gives a positive, health-improving effects [8,9].

2. Material and Methods

To achieve this goal on the basis of the educational institution (Vitebsk State University named after P.M. Masherov) within the framework of the (School of the future mother), we carried out health-improving work with pregnant female students for the first time organized as part of a pedagogical experiment.

On the basis of the doctor's recommendations and the desire of the students to engage in physical exercises, two groups were formed - control and experimental. The study included 16 healthy pregnant female students, referred to the main medical group for health reasons, of which 8 were engaged in specially designed complexes of physical exercises (EG) and 8 female students who did not engage in physical exercises during pregnancy (CG).

For two trimesters of pregnancy, the students attended 70 classes. The duration of one lesson is 30 minutes, 3 times a week (Tuesday, Thursday, Saturday), with musical accompaniment. In the classroom for pregnant students, the following tasks were solved:

- Improve metabolism.
- Strengthen the muscles of the abdomen, back, pelvis, lower extremities.
- Maintain the mobility of the hip and other joints.
- Teach correct breathing.
- Teach voluntary muscle relaxation.
- Improve the functioning of the cardiovascular system, lungs and intestines.
- To activate blood circulation and eliminate congestion in the small pelvis and lower extremities.
- Ensure adequate oxygenation of the blood of the mother and fetus.

3. Research Methods

Pedagogical experiment - during the second and third trimesters of pregnancy, the students performed complexes of physical exercises at the usual moderate pace, aimed at all muscle groups. Proceeding from this, in order to determine the functional state of the organism of a pregnant student, as well as to identify the changes that occur in the body under the influence of physical exercises, constant pedagogical control was carried out. Control studies were carried out before classes, during classes and after classes. The reaction of the organism of pregnant female students to physical activity was determined using generally accepted and generally available research methods: counting the pulse, respiratory rate, measuring blood pressure, spirometry and dynamometry.

In the process of pedagogical observation, the general condition of the students involved and the external signs of fatigue, such as paleness or redness of the face, increased sweating, rapid breathing, stiffness of movements, and impaired coordination, were taken into account.

Blood pressure and heart rate were measured at rest before exercise and after exercise. Blood pressure was measured with a special electronic tonometer, and pulse was measured with a heart rate monitor using the Polar system. Respiration rate was determined at rest before exercise and after exercise. The chest excursion was also determined at rest before and after classes.

Using the methods of mathematical statistics, $(\bar{X} \pm \delta)$ - the arithmetic mean and standard deviation, the dynamics of the indicator over the period of the pedagogical experiment, in percentage terms, t - the criterion of the reliability of the Student's differences and $\alpha = 0.05$ - the level of significance using software were determined Statistika 6.0.

Results and its discussion. Pedagogical research has shown that physical activity during pregnancy improves the general condition of the student, has a beneficial effect on the autonomic nervous system, which innervates the internal organs and blood vessels, helps to reduce toxicosis, reduce the duration of labor and quick recovery after them.

Exercise during pregnancy prevents sagging of the abdomen and prolapse of internal organs, as the elasticity of the pelvic floor muscles is strengthened and increased. Practicing special sets of exercises helps to strengthen the muscles of the whole body, especially the muscles of the back, which bear the greatest load when walking, due to the shift in the center of mass of the body. The mobility of the joints of the pelvis and spine also increases. During the class, students learn breathing skills during childbirth to enhance the oxygen supply to the fetus and correct breathing during childbirth. As a result of the pedagogical experiment, we received the following data (Table 1):

Table: Dynamics of Functional Indicators of Accounting for the Effectiveness of Physical Exercises Fulfillment by Pregnant Female Students (Second and Third Trimesters) of the Control and Experimental Groups.

Indicators	Trimesters of pregnancy in CG (n = 8)		%	Trimesters of pregnancy in the EG (n = 8)		%	P (worthy fidelity)
	Start II	End III		Start II	End III		
	$\bar{X} \pm \delta$			$\bar{X} \pm \delta$			
Heart rate, beats / min	87,75±2,92	92,25±1,49	5,13	83,13±1,60	85,75±1,04	5,56	<0,05
BP _{syst.} , Mm Hg	117,50±1,77	108,00±2,00	-8,09	118,00±1,64	120,13±0,99	1,81	<0,05
AD _{diast.} , Mm Hg	77,25±1,45	71,63±1,31	-7,28	77,36±1,06	80,13±1,06	3,58	<0,05
BH	20,50±1,24	25,49±1,85	24,34	20,24±1,21	18,13±1,62	-10,42	<0,05
EGK, cm	6,00±0,75	4,25±0,87	-29,17	5,13±0,60	7,50±1,07	46,20	<0,05
VC, ml	2600±320	2180±127	-16,15	3200±173	3465±121	8,28	<0,05
Dynamometry (left hand), kg	19,38±1,11	15,38±0,86	-20,64	20,25±0,83	24,75±0,66	22,22	<0,05

Dynamometry (right hand), kg	23,00±1,58	19,25±1,09	-16,30	24,25±1,48	27,69±0,76	14,19	<0,05
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Note: CG - control group; EG - experimental group; $\bar{X} \pm \delta$ - arithmetic mean \pm standard deviation; % - dynamics of the indicator for the period of the pedagogical experiment, in percentage terms; HR - heart rate; ADSist. - blood pressure (systolic); ADdiast. - blood pressure (diastolic); RR - respiratory rate; EGK - chest excursion; VC - vital capacity of the lungs.

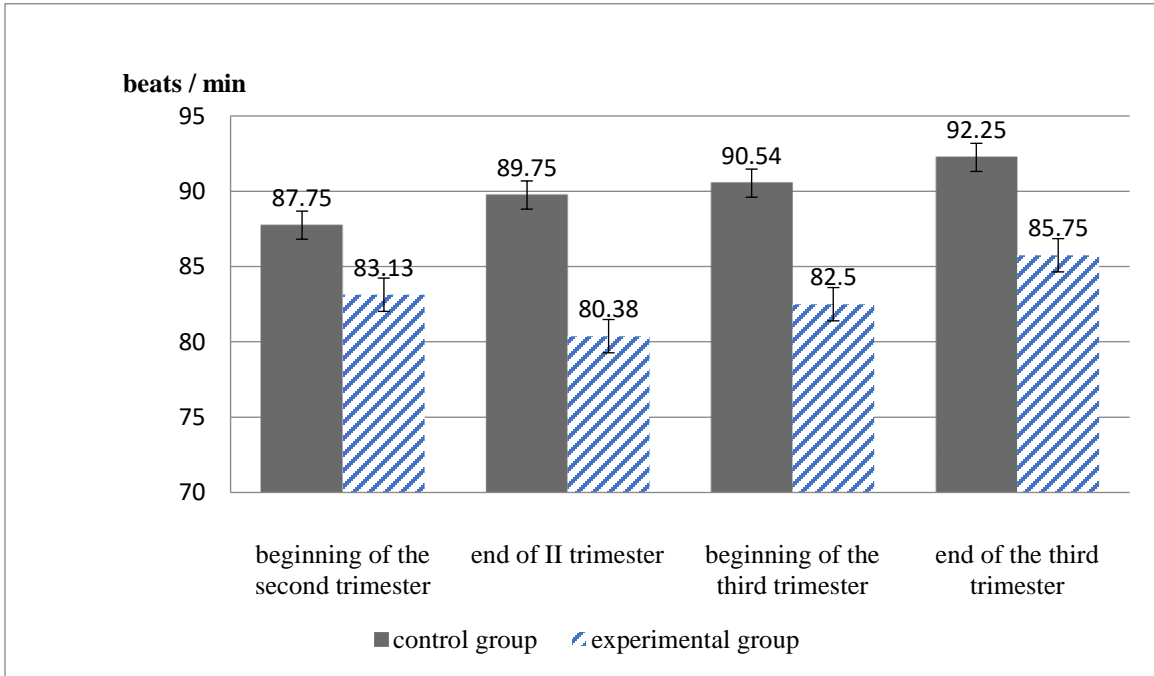


Fig. 1. Dynamics of the heart rate indicator of pregnant female students in the control and experimental groups.

As a result of mathematical processing of the data obtained, it was revealed that the heart rate in the control group was 5.13% with an increase in the average group indicator from 87.75 ± 2.92 to 92.25 ± 1.49 , and in the experimental group these changes were 5, 56% and the average group indicator changed from 83.13 ± 1.60 to 85.75 ± 1.04 .

Based on this, it can be argued that the group of female students who did not study at the School of the Future Mother have a significant deterioration in the functional indicator of the heart rate, and in the experimental group it was possible to keep the heart rate at a sufficiently high level, which is confirmed by the reliability of the obtained results experimental groups ($p < 0.05$) (Fig. 1).

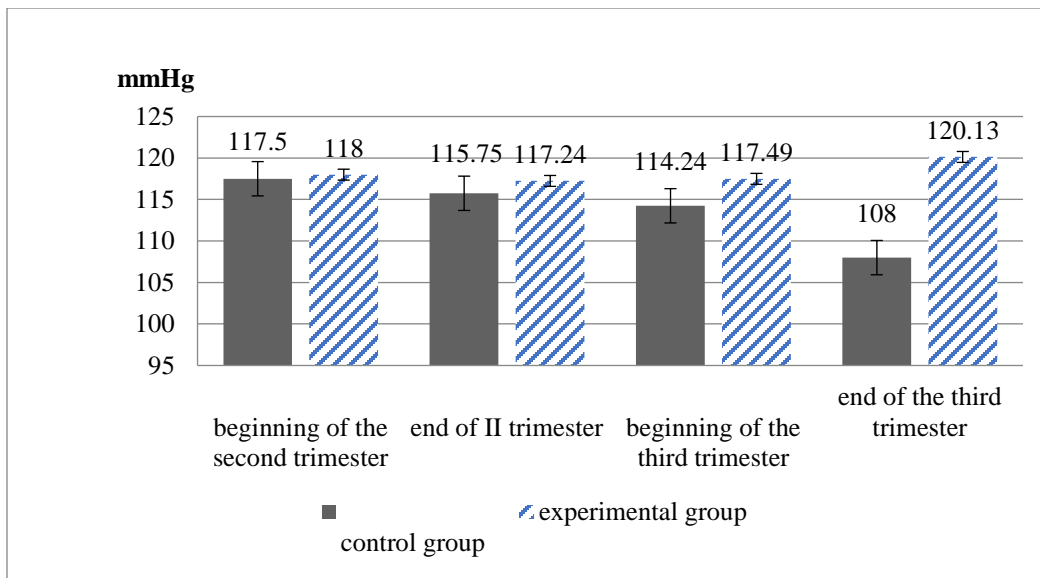


Fig. 2. Dynamics of the blood pressure (systolic) indicator of pregnant female students in the control and experimental groups.

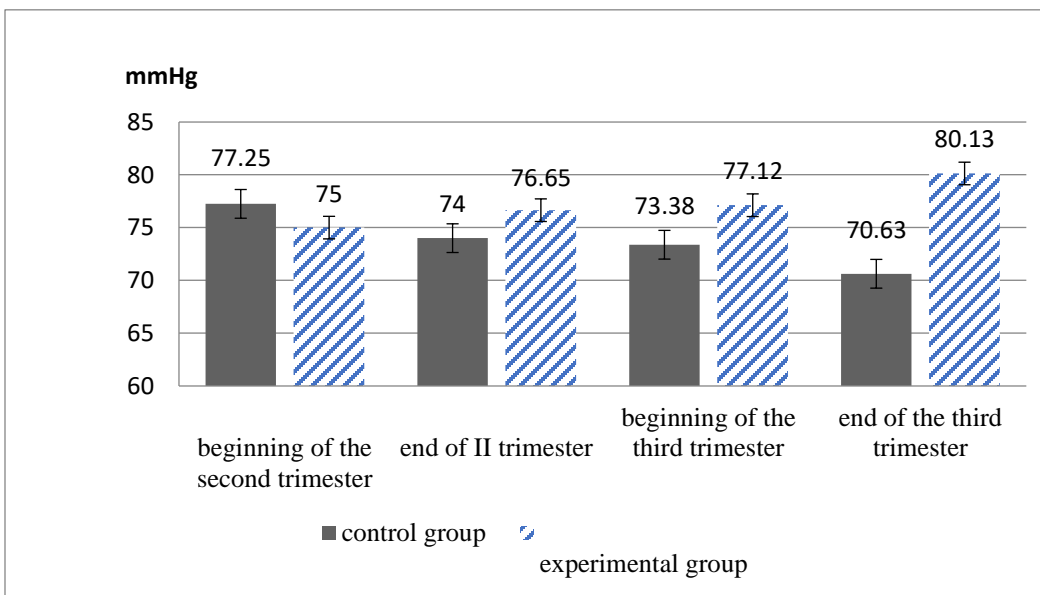


Fig. 3. Dynamics of the blood pressure (diastolic) indicator of pregnant female students in the control and experimental groups.

Also, the pregnant girls in the control group have arterial pressure (systolic). is -8.09% , the average group indicator decreased from 117.5 ± 1.77 to 108.00 ± 2.00 , at the same time, in pregnant female students of the experimental group, blood pressure (diastolic) was recorded at the level of 1.81% , while the average group the indicator increased from 118.00 ± 1.64 to 120.13 ± 0.99 (Fig. 2).

Blood pressure (diastolic) in the control group is -7.28% , the average group indicator decreased from 77.25 ± 1.45 to $71, 63 \pm 1.33$, while in the experimental group at 3.58% , the average group indicator increased from 77.36 ± 1.06 to

80.13 ± 1.06 s (p <0.05) (Fig. 3). Based on the above, we affirm that the introduction of the methodology of physical culture and health-improving classes in a higher education institution is very useful for correcting the physical condition of pregnant female students, taking into account different trimesters of pregnancy.

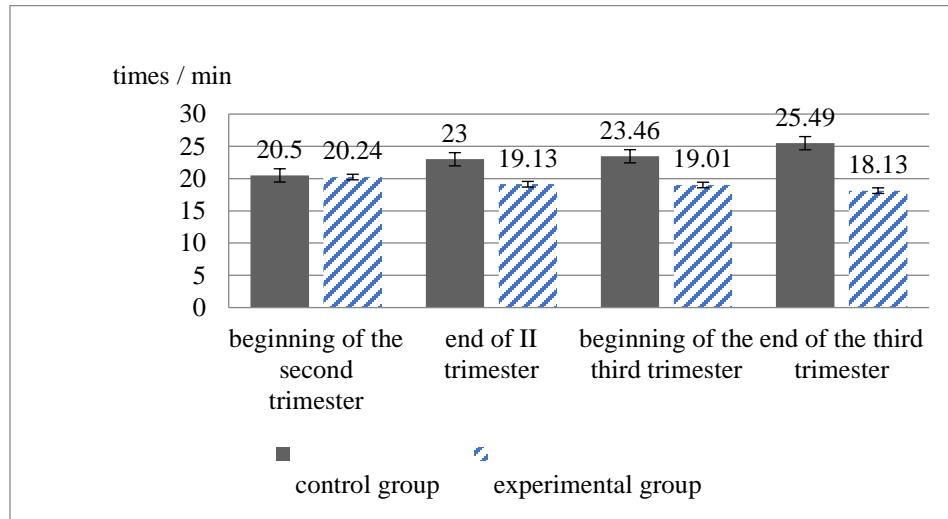


Fig. 4. Dynamics of the respiratory rate indicator of pregnant female students in the control and experimental groups.

It should also be noted that the respiratory rate in pregnant girls from the control group was 24.34%, with an increase in the average group indicator from 20.50 ± 1.24 to 25.49 ± 1.85, along with this, in pregnant girls from the experimental group these changes were fixed at the level of -10.42, while the average group indicator changed from 20.24 ± 1.21 to 18.13 ± 1.62. Thus, special exercises for pregnant women are very effective (p <0.05) (Fig. 4).

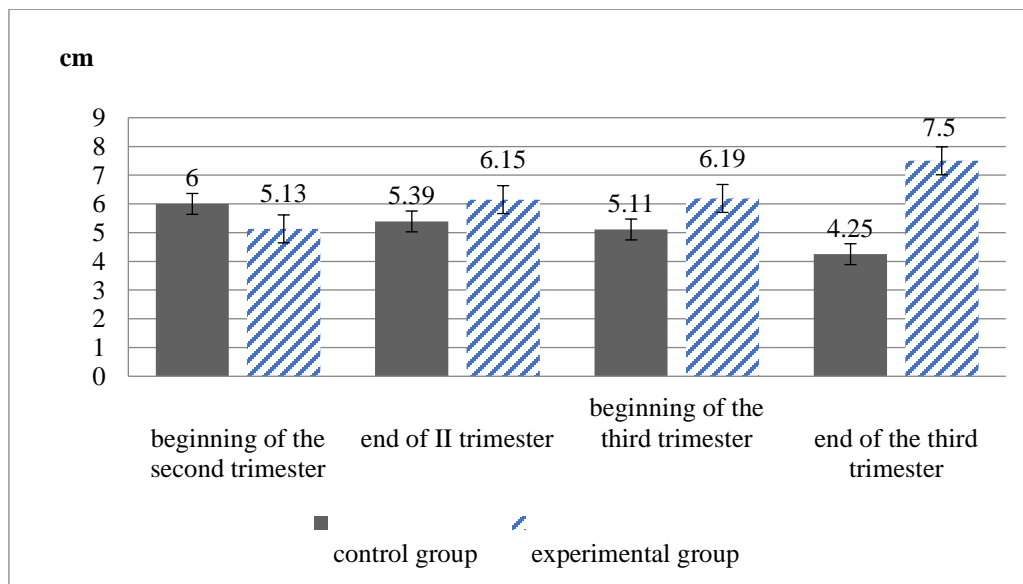


Fig. 5. Dynamics of the indicator of chest excursion of pregnant female students in the control and experimental groups.

According to the functional indicator, chest excursion in the control group was expressed at the level of -29.17%, the average group indicator decreased from 6.00 ± 0.75 to 4.25 ± 0.87 , while in the experimental group the increase in this indicator was 46, 20%, the average group indicator increased from 5.13 ± 0.60 to 7.50 ± 1.07 (Fig. 5). This indicates the rational use of exercise complexes during pregnancy.

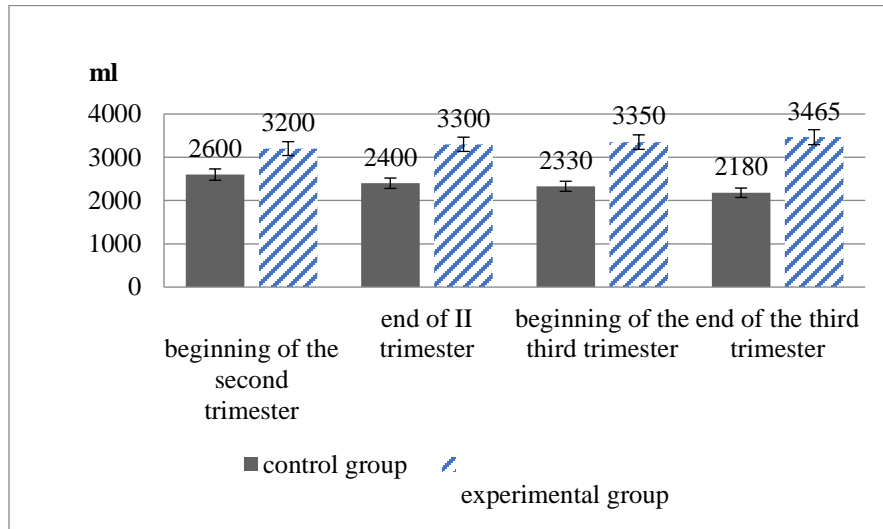


Fig. 6. Dynamics of the indicator of vital capacity of the lungs of pregnant female students in the control and experimental groups.

In general, it is important to pay attention to the dynamics of the vital capacity of the lungs in the control and experimental groups. Thus, in the control group, the vital capacity of the lungs was fixed at -16.15%, and in the experimental group at 8.28%. In the experimental group, the vital capacity of the lungs increased significantly, and in the control group the functional indicator decreased (Fig. 6).

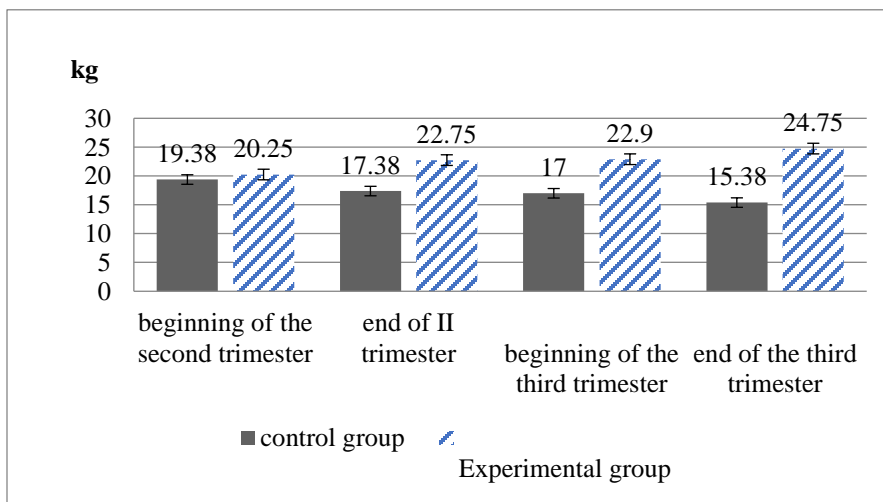


Fig. 7. Dynamics of the muscle strength indicator of the left hand of pregnant female students in the control and experimental groups.

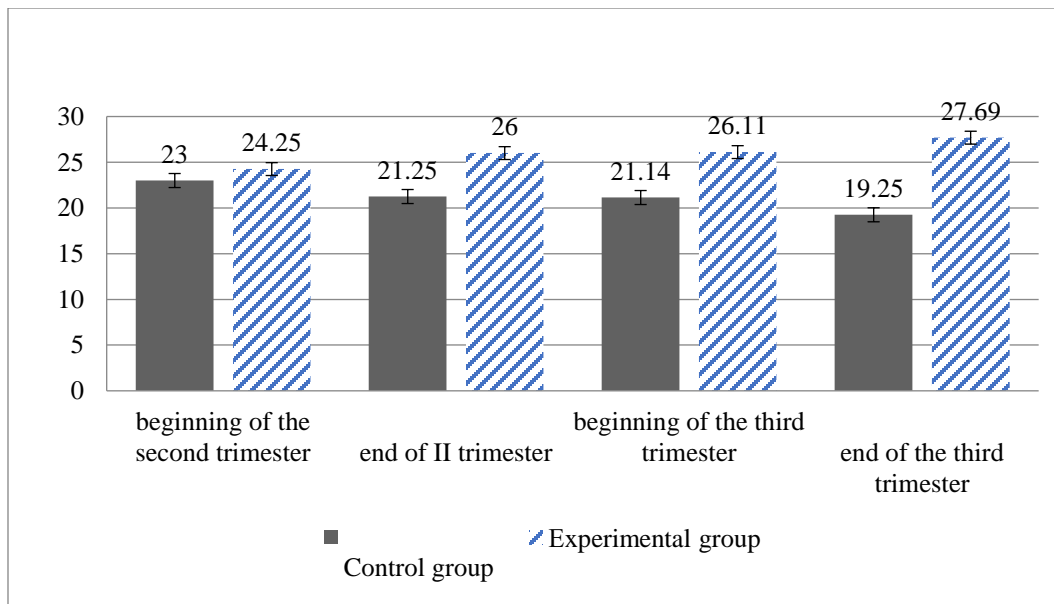


Fig. 8. Dynamics of the muscle strength indicator of the right hand of pregnant female students in the control and experimental groups.

In addition, statistically significant differences in the results of muscle strength of the right hand allow us to assert that the pregnant female students of the experimental group had a more pronounced increase in dynamometry indicators ($p < 0.05$). Thus, among female students of the experimental group, the muscular strength of the left hand is 22.22% (Fig. 7), the average group indicator increased from 20.25 ± 0.83 to 24.75 ± 0.66 , the right hand is 14.19% (Figs. 7 and 8), the average group indicator increased from 24.25 ± 1.48 to 27.69 ± 0.76 . In pregnant female students of the control group, the muscle strength of the left hand is -20.64%, the average group indicator decreased from 19.38 ± 1.11 kg to 15.38 ± 0.86 kg.

Muscle strength of the right hand is -16.30%, the average group indicator decreased from 23.00 ± 1.58 kg to 19.25 ± 1.09 kg. As a result of studying the absolute indices of wrist muscular strength, it was found that pregnant female students who were engaged in special complexes of physical exercises showed a significant increase in dynamometry indices.

4. Conclusion

Thus, the introduction into the educational process of the methodology of physical culture and health-improving classes (School of the future mother) for female students of the second and third trimester of pregnancy, full-time education in non-sports specialties in a higher education institution, in accordance with the program of optional classes in the discipline (Physical culture), confirmed its effectiveness. It was found that regular classes with pregnant female students have a positive effect on heart rate and blood pressure, contribute to an increase in lung capacity and dynamometry.

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