



Development of strength abilities of women taking into account the ovarian-menstrual cycle

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Abstract

Objective of the study was to experimentally prove the effectiveness of the methodology for developing strength abilities in women, taking into account the ovarian-menstrual cycle.

Methods and structure of the study. The experiment involved two groups of women aged 30 years with a normal body mass index (BMI). We used indicators for assessing the level of development of strength abilities in women aged 30 in dynamics and indicators of hypertrophy of their skeletal muscles using a body composition analyzer TANITA BC-601.

Results and conclusions. A program for the development of strength abilities in women has been developed and implemented, taking into account the ovarian-menstrual cycle during recreational fitness. The development of strength abilities in women allows you to optimize the training process. The developed complexes allow to achieve the best end result and complement the multifactorial nature of the problem in planning the training process for women, taking into account the ovarian-menstrual cycle in the practical work of instructors, trainers and in the training of specialists in the field of physical culture and sports.

Keywords: *strength abilities, ovarian-menstrual cycle, skeletal muscle hypertrophy.*

Introduction. Dexterity, flexibility, endurance, speed, strength are the most important physical qualities that determine the physical capabilities of the human body. The human body in modern society experiences enormous physical and emotional stress every day. In order to feel comfortable in the current conditions, it is necessary to pay attention to the development and strengthening of the most important muscle groups. The Arkhangelsk region occupies a strong position in the promotion of physical culture and sports at various levels: regional and Russian. The relevance of the study is to identify the features of the development of strength abilities in women, taking into account the ovarian-menstrual cycle. The number of women who have chosen to pursue a sports career confirms the active development of women's sports. Research is related to the consideration of the characteristics of the training process of women, therefore, knowledge of the structural and functional characteristics of the

female body, changes in body functions that occur during the training process and under the influence of the biological cycle on the performance of women are required. The organization of the training process for women is aimed at the harmonious development of physical qualities, building training with a gradual increase in loads, using gentle training regimes, and taking into account the ovarian-menstrual cycle (OMC) [3, 4, 6].

Objective of the study was to experimentally prove the effectiveness of the methodology for developing strength abilities in women, taking into account the ovarian-menstrual cycle.

Methods and structure of the study. Motor testing was used, which included the following tests: test 1 - "Bending and extending the arms in support (push-ups)"; test 2 - "Pull-up from hanging while lying down"; test 3 - "Abs with fixation of feet." To evaluate the results of motor testing, we used the standards of



the All-Russian Physical Culture and Sports Complex "GTO". To assess the indicators of increase in volume or mass of skeletal muscles, TANITABC-601 analyzer scales were taken.

The study was conducted at a fitness club in Arkhangelsk for 3.5 months. It involved two groups of women aged 30 years with a normal body mass index. To develop and implement a program to increase the level of strength abilities of women during health fitness classes, taking into account the ovarian-menstrual cycle, a calendar planning of the training process has been established. The research took into account the frequency of training sessions per week, the volume of the training load and the technique of performing the exercises.

Note that in the training program (scheme), the permissible heart rate of the subjects during work was included in the established load range - medium intensity zone (74-84%) or high intensity zone (84-100%). The permissible heart rate of the subjects for these intensity zones was calculated by the established load range as a percentage of the maximum permissible heart rate (MHR). The MHR was directly calculated using the Cooper (Karvonen) formula [1]: $MHR = 220 - age$.

To determine the repeated maximum for each participant in the group in each exercise, the following formula was used: "Weight for 10 repetitions / 0.77" [2]. The training process was developed taking into account the ovarian-menstrual cycle of women, the load with weights and the number of approaches and repetitions in the exercises performed.

Results of the study and discussion. The results of indicators assessing the level of development of strength abilities in women 30 years old in the dynamics of the study and indicators of hypertrophy of their skeletal muscles, recorded using the TANITABC-601 body composition analyzer, are presented in tables 1-3 and in the figure.

Based on these research results, the indicators of strength abilities correspond to the age norm and the requirements of the All-Russian physical culture and sports complex "Ready for Labor and Defense" (GTO). The dynamics revealed an increase in strength abilities

in all control exercises. The results of the study in percentage terms are presented in tables 2-3.

Thus, at the end of the study, there is an increase in high levels of strength abilities due to a decrease in the number of women with an average level of strength abilities and the absence of women with low levels of strength abilities in all control tests. Changes in indicators occurred as a result of the implementation of the developed training program for women.

Electronic indicators of skeletal muscle hypertrophy in selected test areas of 30-year-old women were carried out on a body composition analyzer TANITABC-601 in the dynamics of the study. We also chose this type of testing to monitor changes in the strength abilities of the subjects, since under the influence of strength training in a person, the volume (mass) of skeletal muscles increases and, as a consequence, their strength abilities. TANITABC-601 calculated the composition of the human body using the bioelectrical impedance analysis (BIA) method. That is, a study was conducted on the indicators of skeletal muscle hypertrophy in 30-year-old women (see figure).

Dynamics of changes in skeletal muscle hypertrophy indicators in women 30 years old at the beginning and end of the study, kg

Thus, the dynamics of the study revealed an increase in these indicators, which directly indicates an increase in the strength abilities of women. An increase in indicators occurred in all control regions.

The increase in hypertrophy rates of skeletal muscles examined in the dynamics of the study occurred due to the construction of part of the training programs with an emphasis on glycolytic muscle fibers; therefore, due to the increase in the weight of weights, additional inclusion of muscle fibers in the work occurred in order to provoke the destruction of myofibrils at the level of the Z-disc.

Further restoration of myofibrils took place in a larger volume, which directly affected the increase in muscle volume (indicators of hypertrophy) and, as a consequence, their strength abilities; building part of the training programs with an emphasis on oxidative muscle fibers, therefore, thanks to working with an

Table 1. Indicators of strength abilities of women 30 years old at the beginning and at the end of the study (number of times)

Tests	At the beginning of the study	At the end of the study
Raising the body from a supine position	27,5±1,42	30,9±0,93*
Flexion and extension of the arms while lying on the floor	8,59±0,80	11,75±0,92*
Pull-up from hanging lying on a low bar 90 cm	12,1±0,75	15,08±0,93*



Table 2. Indicators of the degree of development of strength abilities of women 30 years old at the beginning of the study (%)

Tests	Strength ability level		
	low	medium	high
Raising the body from a supine position	16,6%	75,0%	8,3%
Flexion and extension of the arms while lying on the floor	41,6%	58,3%	0%
Pull-up from hanging lying on a low bar 90 cm	25,0%	66,6%	8,3%

Table 3. Indicators of the degree of development of strength abilities of women 30 years old at the end of the study (%)

Tests	Strength ability level		
	low	medium	high
Raising the body from a supine position	0%	33,3%	66,7%
Flexion and extension of the arms while lying on the floor	0%	41,7%	58,3%
Pull-up from hanging lying on a low bar 90 cm	0%	25,0%	75,0%

average weight of weights from a repeated maximum and limiting the range of motion in the exercises performed, vascular occlusion was created, which in turn increased the volume of the muscle fiber directly during the exercises and provoked a rupture myofibrils at the level of the Z-disc. This circumstance was also aimed at the process of increasing the total number of myofibrils (muscle fiber volume), which in turn meant an increase in skeletal muscle hypertrophy and, as a consequence, an increase in the strength abilities of the study participants; The training process of the studied women was monitored, including from the point of view of taking into account a greater number of central factors stimulating skeletal muscle hypertrophy; an increase in the indicators of skeletal muscle hypertrophy of the studied women was observed in all selected test areas.

Conclusions. It has been established that the developed training program can effectively increase the level of strength abilities, and therefore the level of muscle mass in women in the gym, taking into account the influence of the biological cycle. The study revealed an increase in the strength abilities of the women studied in all control exercises, as well as an increase in the hypertrophy of their skeletal muscles in all selected control areas.

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