



Features of Special Physical Training for Female Athletes in Cossack Fight during Different Phases of a Specific Biological Cycle

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Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Accepted for Publication: April 6, 2024

Published: April 30, 2024

DOI: 10.17309/tmfv.2024.2.15

Abstract

Background. The training methods for female athletes' special physical training are considered to be a crucial aspect of the overall preparation system for competitive activity, which requires correct planning and implementation.

Objectives. The study aimed to determine the impact of special preparatory exercises on female athletes engaged in Cossack Fight, depending on the characteristics of the body's functioning in different phases of a specific biological cycle.

Materials and methods. The study involved 20 female athletes aged 17-24 years who participated in Cossack Fight, and were divided into experimental and control groups. The qualification levels of female athletes in the experimental group were as follows: 1 – Master of Sports of Ukraine; 2 – Candidates for Master of Sports of Ukraine; 7 – 1 sports category. The control group comprised: 1 – Master of Sports of Ukraine; 2 – Candidates for Master of Sports of Ukraine; 7 – 1 sports category. The training program lasted for ten weeks and took place at a special preparatory and control-preparatory stage of the preparatory period.

Results. The findings showed that the variability of training loads, depending on the phase of the ovarian-menstrual cycle, had a statistically significantly greater impact on the indicators of special physical fitness in the female athletes' experimental group compared to the control group. Thus, after ten weeks of special physical training, the experimental group demonstrated a significant increase in the number of direct punches on the punching bag in 4 seconds ($t=4.07$; $p<0.001$) and 15 seconds ($t=3.62$; $p<0.001$), throwing a medicine ball weighing 3 kg ($t=2.92$; $p<0.05$), repeated circular kicks on the punching bag to the torso level for 15 seconds ($t=4.22$; $p<0.001$), direct punches on the punching bag for 1 minute ($t=4.23$; $p<0.001$), repeated circular kicks on the punching bag for 1 minute ($t=4.49$; $p<0.001$), and jumping rope after exercise (a 3-minute punching bag workout) for 1 minute ($t=3.55$; $p<0.001$).

Conclusions. The implementation of an experimental program for special physical training of female athletes, in accordance with the phases of the ovarian-menstrual cycle, into the general system of preparation for competitive activity, leads to a statistically reliable improvement in key indicators of physical fitness.

Keywords: cossack fight, special physical training, training process, ovarian-menstrual cycle.

Introduction

One of the main trends in the development of modern martial arts in the world is the increase every year in the number of women who systematically train and compete in sports competitions. The same trend can be clearly seen in the Ukrainian national form of combat sport – the Cossack Fight (Lytvynenko, 2023; Lytvynenko, Mulyk, 2023). An analysis of special literature on the theory and methodology of sports training for women shows that in many works the authors

study the structural features and physiological processes of the female body in connection with reproductive function (Alfaro-Magallanes, Romero-Parra, 2023; Shakhlyna et al., 2016; Badenhurst et al., 2021). A number of studies reveal the peculiarities of the functioning of the female body and psychological processes under the influence of significant physical activity in different phases of the ovarian-menstrual cycle (OMC) (Vorontsov, 2020; Arenas-Pareja & López-Sierra, Ibáñez, 2023). The works Mulyk (2016) Shakhlyna, Chystyakova, and Avinov (2022), shows differences in the structure and functioning of the female body and the level of development of physical and psychophysical qualities depending on biological age and experience in sports. A number of studies (Shakhlyna,

2021; Lysenko, Hasanova, Shynkaruk, 2021) are devoted to the influence of sex hormones on the dynamics of physical performance during the training of women in various sports. Experts have established the dependence of the performance indicators of female athletes in certain sports and the reaction of their body to training loads depending on changes in the concentration of sex hormones in different phases of OMC (Janse de Jonge, 2003; Kanunova et al., 2020). A number of studies have shown the individual dynamics of changes in the performance of female athletes in individual phases of OMC (Alfaro-Magallanes et al., 2023; Baranauskas et al., 2023).

The training process of highly qualified female athletes in martial arts shows that with each decade it becomes more and more specialized (Shakhlina, 2021; Lytvynenko, Mulyk, 2023). According to researchers, this is due to the need for the greatest compliance of means and methods of sports training with the requirements of competitive activity. The priority of developing speed-strength qualities to achieve maximum competitive results of female athletes in martial arts is shown in the works (Ashanin, & Lytvynenko, 2023). Analysis of data from specialized literature on combat sports and our own research show that the volume and intensity of training loads of female athletes in Ukrainian national types of combat sports have reached natural limits and it is necessary to search for new ways to improve sports training (Mulyk, & Dzhym, 2017).

The issues of constructing special physical training of female athletes of Ukrainian national martial arts, taking into account changes in the physiological indicators of women in various phases of a specific biological cycle, have not been sufficiently studied.

Purpose of the study. To determine the impact of the use of special preparatory exercises on female athletes engaged in Cossack Fight, depending on the characteristics of the functioning of the body in different phases of a specific biological cycle.

Materials and methods

Participants

The sample of this study included 20 qualified female athletes from the Cossack Fight aged 17-24 years, divided into experimental and control groups. Qualification level of athletes of the experimental group: 1 – master of sports of Ukraine; 2 – candidate master of sports of Ukraine; 7 – 1 sports category, control group: 1 – master of sports of Ukraine; 2 – candidate master of sports of Ukraine; 7 – 1 sports category.

Organization of the Study

The following research methods were used: theoretical analysis and generalization of data from specialized literature,

methods of pedagogical control (testing of motor qualities, pedagogical observations, methods for determining a specific biological cycle (measurement of oral-basal temperature, crystallization of nasal mucus), methods of mathematical statistics).

The training programs lasted ten weeks and took place at special preparatory and control-preparatory stages of the preparatory period.

The following research methods were used: theoretical analysis and generalization of data from specialized literature, methods of pedagogical control (testing of motor qualities, pedagogical observations, methods for determining a specific biological cycle (measurement of oral-basal temperature, crystallization of nasal mucus), methods of mathematical statistics).

The training programs lasted ten weeks and took place at special preparatory and control-preparatory stages of the preparatory period (fig. 1).

Testing Procedure

Testing took place during a control training session, at the same time for each participant, under the same conditions, without injuries, in a good emotional state. Before testing, participants performed an individual warm-up. Immediately before performing the test exercises, participants were instructed to exert maximum effort. Test exercises were used that were standard for determining the level of special physical fitness in martial arts of striking, wrestling and mixed types: direct punches on a bag for 4 s, straight punches on a bag for 15 s, throwing a medicine ball weighing 3 kg, repeated circular kicks on the bag to the level of the torso for 15 s, double leg takedown for 20 s, running onto the “springboard” around the head, 5 times to the right and left, dynamometry of the muscles of the leading hand, direct punches to the bag for 3 min, repeated circular kicks to the level of the body for 1 minute, jumping rope after exercise (work on a bag lasting 3 minutes) in 1 minute

Statistical Analysis

The research materials were processed in the statistical analysis program – IBM SPSS 20. The following statistics were calculated for each variable: mean value (X), standard deviation (s), standard deviation error (m), Student's t-test for independent and pairwise related samples.

Results

Testing at the beginning of the retracting microcycle did not reveal a significant difference between the study groups in indicators of special preparedness (Table 1).

Periods	Preparatory								
Stages	Special preparatory						Control preparatory		
Mesocycles	Retracting from SPP and STP		Basic from SPP and STP				Control preparatory		
Microcycles	Rt	Rs	Sh	Rs	Sh	Rs	Cp	Rs	Cp

Fig. 1. Structure of the specially preparatory and control preparatory stages of the preparatory period. Note: Microcycles: Rt – retractor, Sh – shock, Rs – restorative, Cp – control preparatory

After the end of the special preparatory stage (basic mesocycle for special training and control and preparatory mesocycle), repeated testing was carried out, the results of which are presented in Table 2.

As evidenced by the data obtained for most indicators corresponding to the manifestation of special motor actions, such as direct punches to the bag for 4 s, 15 s and 3 min, repeated circular kicks on the bag to the level of the torso for 15 s and in 1 minute, as well as Jumping rope after exercise for 1 minute, significantly better results were obtained from female athletes in the experimental group ($p < 0.05$).

In addition, during the implementation of the experimental program, the results in terms of the number of direct punches on the bag in 4 s ($t = 4.07$; $p < 0.001$) and in 15 s increased significantly ($t = 3.62$; $p < 0.001$), throwing a medicine ball weighing 3 kg ($t = 2.92$; $p < 0.05$), repeated circular kicks on the bag to the level of the body in 15 s ($t = 4.22$; $p < 0.001$), direct punches to the bag for 1 min ($t = 4.23$; $p < 0.001$), repeated circular kicks to the bag for 1 min ($t = 4.49$; $p < 0.001$) and jumping rope after exercise (work on the bag for 3 minutes) for 1 minute ($t = 3.55$; $p < 0.001$) (Table 3).

Along with this, less significant changes were obtained in the control group (Table 4).

Discussion

The main results of our study revealed noticeable differences, in terms of indicators of special physical fitness, between the experimental and control groups of female Cossack Fight athletes. The variability of training loads depending on the phase of OMC made it possible to improve the indicators of special physical fitness of the experimental group of female athletes compared to the control group. During the implementation of the experimental program, the results in terms of the number of direct punches to the bag for 4 s, increased significantly ($t = 4.07$; $p < 0.001$) and in 15 s ($t = 3.62$; $p < 0.001$), throwing a medicine ball weighing 3 kg ($t = 2.92$; $p < 0.05$), repeated circular kicks on the bag to the level of the torso for 15 s ($t = 4.22$; $p < 0.001$), direct punches on the bag for 1 min. ($t = 4.23$; $p < 0.001$), repeated circular kicks to the level of the torso for 1 min ($t = 4.49$; $p < 0.001$) and jumping rope after exercise (work on a bag lasting 3 minutes) in 1 min ($t = 3.55$; $p < 0.001$).

Table 1. Results of testing indicators of special physical preparedness of qualified female athletes in the Cossack Fight (competition section Hertz 3) of the control and experimental groups at the beginning of the special preparatory stage of annual training ($n_1 = n_2 = 10$), ($\bar{X} \pm m$)

No	Test exercises	Control group	Experimental group	t	p
1	Direct punches to the bag for 4 s, times	8.1±0.18	8.0±0.17	0.42	>0.05
2	Direct punches to the bag for 15 s, times	35.3±0.46	36.1±0.48	1.21	>0.05
3	Throwing a medicine ball weighing 3 kg, m	6.5±0.16	6.4±0.16	0.44	>0.05
4	Repeated circular kicks on the bag to the level of the torso for 15 s, times	15.5±0.31	15.3±0.30	0.46	>0.05
5	Double leg takedown in 20 s., times	10.9±0.20	10.8±0.19	0.38	>0.05
6	Running on the "springboard" around the head, 5 times to the right and left, s	33.0±0.41	32.7±0.40	0.53	>0.05
7	Dynamometry of the muscles of the leading hand, kg	29.3±0.39	29.5±0.40	0.36	>0.05
8	Direct punches on the bag for 3 minutes, times	189.9±2.11	186.7±2.10	1.08	>0.05
9	Repeated circular kicks to the level of the torso for 1 min, times	39.9±0.48	39.2±0.47	0.56	>0.05
10	Jumping rope after exercise (work on a bag lasting 3 minutes) in 1 min, times	59.9±0.52	60.0±0.50	0.40	>0.05

Table 2. Results of testing indicators of special physical fitness of qualified female athletes in the Cossack Fight (competition section Hertz 3) of the control and experimental groups at the end of the study ($n_1 = n_2 = 10$), ($\bar{X} \pm m$)

No	Test exercises	Control group	Experimental group	t	p
1	Direct punches to the bag for 4 s, times	8.4±0.20	9.1±0.21	2.42	<0.05
2	Direct punches to the bag for 15 s, times	36.7±0.47	38.6±0.50	2.75	<0.05
3	Throwing a medicine ball weighing 3 kg, m	6.8±0.50	7.1±0.18	1.00	<0.05
4	Repeated circular kicks on the bag to the level of the torso for 15 s, times	15.8±0.32	17.2±0.33	3.04	<0.01
5	Double leg takedown in 20 s, times	10.9±0.20	11.1±0.22	0.71	>0.05
6	Running on the "springboard" around the head, 5 times to the right and left, s	33.0±0.41	32.5±0.40	0.88	>0.05
7	Dynamometry of the muscles of the leading hand, kg	30.2±0.38	30.6±0.39	0.74	>0.05
8	Direct punches on the bag for 3 minutes, times	192.3±2.12	199.4±2.14	2.36	<0.05
9	Repeated circular kicks to the level of the torso for 1 min, times	40.4±0.49	42.3±0.51	2.68	<0.05
10	Jumping rope after exercise (work on a bag lasting 3 minutes) in 1 min, times	60.4±0.54	69.7±0.57	2.95	<0.05

Table 3. Results of testing indicators of special physical fitness of qualified athletes in the Cossack Fight (competition section Hertz 3) of the experimental group at the beginning and at the end of the study (n=10), (X±m)

No	Test exercises	At the beginning	At the end	t	p
1	Direct punches to the bag for 4 s, times	8.0±0.17	9.1±0.21	4.07	<0.001
2	Direct punches to the bag for 15 s, times	36.1±0.48	38.6±0.50	3.62	<0.001
3	Throwing a medicine ball weighing 3 kg, m	6.4±0.16	7.1±0.18	2.92	<0.05
4	Repeated circular kicks on the bag to the level of the torso for 15 s, times	15.3±0.30	17.2±0.33	4.22	<0.001
5	Double leg takedown in 20 s, times	10.8±0.19	11.1±0.22	1.03	>0.05
6	Running on the "springboard" around the head, 5 times to the right and left, s	32.7±0.40	32.5±0.40	0.51	>0.05
7	Dynamometry of the muscles of the leading hand, kg	29.5±0.40	30.6±0.39	1.96	>0.05
8	Direct punches on the bag for 3 minutes, times	186.7±2.10	199.4±2.14	4.23	<0.001
9	Repeated circular kicks to the level of the torso for 1 min, times	39.2±0.47	42.3±0.51	4.49	<0.001
10	Jumping rope after exercise (work on a bag lasting 3 minutes) in 1 min, times	60.0±0.50	62.7±0.57	3.55	<0.001

Table 4. Results of testing indicators of special physical fitness of qualified athletes in the Cossack Fight (competition section Hertz 3) of the control group at the beginning and at the end of the study (n=10), (X±m)

No	Test exercises	At the beginning	At the end	t	p
1	Direct punches to the bag for 4 s, times	8.1±0.18	8.4±0.20	1.15	>0.05
2	Direct punches to the bag for 15 s, times	35.3±0.46	36.7±0.47	2.12	<0.05
3	Throwing a medicine ball weighing 3 kg, m	6.5±0.16	6.8±0.17	1.30	>0.05
4	Repeated circular kicks on the bag to the level of the torso for 15 s, times	15.5±0.31	15.8±0.32	0.67	>0.05
5	Double leg takedown in 20 s, times	10.9±0.20	10.9±0.20	0.0	<0.05
6	Running on the "springboard" around the head, 5 times to the right and left, s	33.0±0.41	33.0±0.41	0.0	<0.05
7	Dynamometry of the muscles of the leading hand, kg	29.3±0.39	30.2±0.38	1.67	>0.05
8	Direct punches on the bag for 3 minutes, times	189.9±2.11	192.3±2.12	0.80	>0.05
9	Repeated circular kicks to the level of the torso for 1 min, times	39.9±0.48	40.4±0.49	0.26	>0.05
10	Jumping rope after exercise (work on a bag lasting 3 minutes) in 1 min, times	59.9±0.52	60.4±0.54	0.21	>0.05

The results of the study complement the data on increasing the speed and coordination capabilities of female athletes specializing in judo in the postmenstrual and postovulatory phases of the ovarian-menstrual cycle (Shakhlina et al., 2022).

The data obtained confirm the information that periodic changes in hormonal levels in the female body affect the ability to adequately respond to training loads (Bosenko, Orlik, & Palshkova, 2019; Dzhy, 2017; Kyrychenko, 2021; Kanunova, & Piven, 2020), the data obtained confirm the information that periodic changes in hormonal levels in the female body affect the ability to adequately respond to training loads. (Mulyk, 2016; Bosenko, Orlik, & Palshkova, 2019; Shakhlina, Chystyakova, Avinov, 2022).

The results of the study can be used to improve the training system for female athletes in the types of combat sports of striking, wrestling and mixed types.

In future works, the authors plan to study the dynamics of indicators of psychophysiological qualities of female athletes in Ukrainian national types of combat sports.

Conclusions

A significant increase in the number of female athletes involved in Ukrainian national types of combat sports

requires a theoretical justification of approaches to building the training process and the formation of special physical training methods taking into account the specific biological cycle. The use of significant and heavy loads in the training process for special physical training in the postmenstrual and postovulatory phases of a specific biological cycle and a decrease in load in other phases of OMC contributes to a significant increase in the indicators of special physical fitness of female athletes. The use of special preparatory exercises at the end of a training session against the background of fatigue in the phases of increased performance of female athletes (postmenstrual and postovulatory) makes it possible to increase the competitive performance of female athletes in the combat sports of Cossack Fight.

Conflict of interest

The authors guarantee that there is no conflict of interest.

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Особливості спеціальної фізичної підготовки жінок-спортсменок у козацькому двобої в різних фазах специфічного біологічного циклу

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 6 с., 4 табл., 1 рис., 30 джерел.

Історія питання. Тренувальні методики спеціальної фізичної підготовки спортсменок-жінок є важливою частиною загальної системи підготовки до змагальної діяльності, що потребує коректного планування та реалізації.

Мета дослідження. Визначити вплив застосування спеціально-підготовчих вправ на жінок-спортсменок з козацького двобою, в залежності від особливостей функціонування організму в різних фазах специфічного біологічного циклу.

Матеріали та методи. В експерименті взяли участь 20 жінок-спортсменок з козацького двобою віком 17-24 років поділених на експериментальну та контрольну групи. Кваліфікаційний рівень спортсменок експериментальної групи: 1 – майстер спорту України; 2 – кандидат у майстри спорту України; 7 – 1 спортивний розряд, контрольної групи: 1 – майстер спорту України; 2 – кандидат у майстри спорту України; 7 – 1 спортивний розряд. Програма тренувань тривала десять тижнів і проходила на спеціальному підготовчому та контрольно-підготовчому етапах підготовчого періоду.

Результати. Варіативність тренувальних навантажень в залежності від фази оваріально-менструального циклу має статистично достовірно більший вплив на показники спеціальної фізичної підготовленості експериментальної групи жінок-спортсменок у порівнянні з контрольною групою. Так, в експериментальній групі після десяти тижнів тренувань із спеціальної фізичної підготовки суттєво підвищилися результати в показниках кількості прямих ударів руками по мішку за 4 с ($t=4,07$; $p<0,001$) та за 15 с. ($t=3,62$; $p<0,001$), метанні набивного м'яча масою 3 кг ($t=2,92$; $p<0,05$), повторних колових ударів ногами по мішку на рівень тулуба за 15 с ($t=4,22$; $p<0,001$), прямих ударів руками по мішку за 1 хв ($t=4,23$; $p<0,001$), повторних колових ударів ногами по мішку за 1 хв ($t=4,49$; $p<0,001$) та стрибків зі скалкою після навантаження (робота на мішку тривалістю 3 хв) за 1 хв. ($t=3,55$; $p<0,001$).

Висновки. Впровадження експериментальної програми із спеціальної фізичної підготовки жінок-спортсменок у відповідності до фаз оваріально-менструального циклу в загальну систему підготовки до змагальної діяльності статистично достовірно покращує ключові показники фізичної тренуваності.

Ключові слова: козацький двобій, спеціальна фізична підготовка, тренувальний процес, оваріально-менструальний цикл.

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Cite this article as: Lytvynenko, A., Mulyk, V., & Dugina, L. (2024). Features of Special Physical Training for Female Athletes in Cossack Fight during Different Phases of a Specific Biological Cycle. *Physical Education Theory and Methodology*, 24(2), 298–303. <https://doi.org/10.17309/tmfv.2024.2.15>

Received: 16.02.2024. Accepted: 06.04.2024. Published: 30.04.2024

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