

FEATURES OF CONSTRUCTION OF A TRAINING PROCESS AT THE PRECOMPETITIVE STAGE OF PREPARATION OF QUALIFIED SPORTSWOMEN SPECIALIZING IN THE MODERN PENTATHLON

Sevdalev Sergey¹, Vrublevskiy Eugeniy^{1,2}, Kozhedub Marina¹

¹*Gomel State University Named after Francisk Skorina*

²*University of Zielona Góra*

Анотація:

Abstracts: The relevance of the work is due to the fact, that nowadays modern pentathlon is one of the most intensively developing sports. It consists of five different disciplines and includes a variety of all-around sport types. The steady growth of sports results, constantly improving rules and regulations of competitions in this sport require specialists, coaches and athletes to search for new effective ways to improve the training system for women specializing in modern pentathlon. **The purpose** of the study is to identify the main directions of the planning of the training process for female athletes specializing in modern pentathlon, taking into account the biorhythmological features of their body. The developed training structure for the pre-competitive stage of the annual cycle was tested. To achieve the purpose of the study we used the following research **methods**: analysis of scientific and methodological literature, pedagogical testing, questionnaire, pedagogical experiment, methods of mathematical processing of the obtained materials. **The results of the study.** The optimal structure of the ratio of types of training orientations in the pre-competitive stage of preparation was experimentally substantiated. Thus, the microcycle should include the following stages: fencing and horseback riding (3 training sessions each), swimming (5 trainings), shooting (2 trainings), running (6 training sessions, 2 of which are the combined relay trainings). Also, the training process should include complexes of special athletics exercises. **Conclusions.** In the course of experimental studies, it was proved that specialists in the precompetitive preparation of qualified pentathlon athletes should individualize the training process and take into account the correspondence of the dynamics of training loads to rhythmic, wave-like changes in the functional state caused by the OMC.

Ключові слова:

modern pentathlon, pre-competitive stage, sportswomen, preparation, planning, individualization.

Особливості побудови тренувального процесу кваліфікованих спортсменок, що спеціалізуються в сучасному п'ятиборстві, на передзмагальному етапі підготовки.

Севдалев Сергій, Врублевський Євген, Кожедуб Марина

Актуальність роботи обумовлена тим, що сучасне п'ятиборство є одним з видів спорту, що найбільш інтенсивно розвивається і включає в себе різновид спортивного багатоборства, що складається з п'яти різних дисциплін. Неухильне зростання спортивних результатів, постійне вдосконалення правил і регламенту змагань в цьому виді спорту вимагають від фахівців, тренерів пошуку нових ефективних шляхів вдосконалення системи підготовки жінок, що спеціалізуються в сучасному п'ятиборстві. **Мета дослідження** – виявити основні напрямки планування тренувального процесу спортсменок, що спеціалізуються в сучасному п'ятиборстві, з урахуванням біоритмологічних особливостей їх організму, а також апробована розроблена структура підготовки на передзмагальному етапі річного циклу. Для вирішення поставленої мети нами використовувалися наступні **методи**: аналіз науково-методичної літератури, педагогічне тестування, анкетування, педагогічний експеримент, методи математичної статистики. **Результати дослідження.** Експериментально обґрунтована оптимальна структура співвідношення видів тренувальної спрямованості на передзмагальному етапі підготовки. Так, мікроцикл повинен включати в себе наступні етапи: фехтування і верхова їзда (по 3 тренувальних заняття), плавання (5 занять), стрільба (2 заняття), бігова підготовка (6 тренувальних занять, 2 з яких – комбінована естафета). Так само в тренувальний процес слід включати комплекси спеціальних легкоатлетичних вправ. **Висновки.** Доведено, що фахівцям в передзмагальній підготовці кваліфікованих п'ятиборок слід індивідуалізувати тренувальний процес і враховувати відповідність динаміки тренувальних навантажень ритмічним, хвилеподібним змінам функціонального стану, обумовленого ОМЦ.

сучасне п'ятиборство, передзмагальний етап, спортсменки, підготовка, планування, індивідуалізація.

Особенности построения тренировочного процесса квалифицированных спортсменок, специализирующихся в современном пятиборье, на предсоревновательном этапе подготовки.
Севдалев Сергей, Врублевский Евгений, Кожедуб Марина

Актуальность работы обусловлена тем, что современное пятиборье является одним из наиболее интенсивно развивающихся видов спорта и включает в себя разновидность спортивного многоборья, состоящего из пяти различных дисциплин. Неуклонный рост спортивных результатов, постоянно совершенствующиеся правила и регламент соревнований в этом виде спорта требуют от специалистов, тренеров поиска новых эффективных путей совершенствования системы подготовки женщин, специализирующихся в современном пятиборье. **Цель исследования** – выявить основные направления планирования тренировочного процесса спортсменок, специализирующихся в современном пятиборье, с учетом биоритмологических особенностей их организма, а также апробирована разработанная структура подготовки на предсоревновательном этапе годового цикла. Для решения поставленной цели нами использовались следующие **методы**: анализ научно-методической литературы, педагогическое тестирование, анкетирование, педагогический эксперимент, методы математической статистики. **Результаты исследования.** Экспериментально обоснована оптимальная структура соотношения видов тренировочной направленности в предсоревновательном этапе подготовки. Так, микроцикл должен включать в себя следующие этапы: фехтование и верховая езда (по 3 тренировочных занятия), плавание (5 занятий), стрельба (2 занятия), беговая подготовка (6 тренировочных занятий, 2 из которых – комбинированная эстафета). Так же в тренировочный процесс следует включать комплексы специальных легкоатлетических упражнений. **Выводы.** Доказано, что специалистам в предсоревновательной подготовке квалифицированных пятиборок следует индивидуализировать тренировочный процесс и учитывать соответствие динамики тренировочных нагрузок ритмическим, волнообразным изменениям функционального состояния, обусловленного ОМЦ.

современное пятиборье, предсоревновательный этап, спортсменки, подготовка, планирование, индивидуализация.

Formulation of the problem. The factors that make the improvement of the sports training system one of the basic conditions for the further growth of sports achievements are the current level of sports achievements, an increase in the density of results in competitions of the highest level and maximum training loads, which sometimes reaches the body's maximum capabilities.

Modern pentathlon is one of the most intensively developing sports and it includes a variety of all-around sport types. It consists of five disciplines: swimming, fencing, horse riding and laser-run (running and shooting). The steady growth of sports results, constantly improving rules and regulations of competitions in this sport require specialists, coaches and athletes to search for new effective ways to improve the training system of pentathletes [1, 4, 8, 9, 11].

Currently, the modern pentathlon is a complex type of sport, which includes: fencing, swimming, horseback riding (show jumping) and a combined type (running, shooting). Since 1996, all disciplines of the complex have been carried out during one competitive day. This creates extremely difficult conditions for morphofunctional systems of the body of athletes [6], as a prerequisite for the realization of its maximum capabilities.

Such competitions are different in orientation and nature. They require modern pentathletes to manifest a significant number of physical qualities and motor skills of different orientations, due to the structure and content of the competitive activity of a sport [3, 7].

To achieve a high result in the all-around sports such as pentathlon, it is necessary to combine the volumes of training exercises, aimed at increasing the effectiveness in individual parts of it [4-6]. Naturally, this can only be done by clearly imagining the effectiveness of the tools used and the optimal conditions for their simultaneous and consistent combination in one training session in a weekly, annual, and long-term training cycle [1, 2, 6].

The existing training technique allows the strongest pentathletes to achieve fairly high results in individual parts of pentathlon. Thus, in swimming, the level of preparedness of athletes often goes beyond the norm of a master of sports, pentathletes often win big competitions in jumping and fencing. However, in the running part of modern pentathlon (laser-run), the level of preparedness of athletes (according to the running results) exceeds the first-level qualification in athletics rather rarely. [8, 14].

Analysis of recent research and publications. Evaluation of the results of the performance of highly-qualified athletes at the top tournaments of recent years in modern pentathlon has shown, that about 45% of the total result comes from the laser-run. The remaining types (fencing, swimming and show jumping) give 55% [1]. In the women's pentathlon, the total score obtained from the combined relay is even more significant. For some athletes it reaches up to 50%. Therefore, at present, the increasing of the efficiency of running training of pentathletes is the main reserve for the growth the athletic performance [9].

An individualized approach to the planning of all the structural units of the pentathlon, in its turn, should become the basis for improving the system of training qualified athletes in this kind of sport. Practical experience indicates, that in sports activities there are some aspects which are inherent only in women's sports. They are determined by the differences in the course of adaptation processes in the female body, characterizing its functional features [2, 3, 6].

Moreover, most studies on the influence of sport on the body, as well as justification of the training regime and the methodology of it, were conducted on male athletes. As a result, their results were often translated into the process of organizing the training process for women, which is far from being legitimate.

According to some authors [2, 3, 6, 7, 16], as women's results shift closer to the zone of ultimate sporting achievements, this approach is not only irrelevant, but also irrational. It basically diverges from the existing scientific knowledge about unique, specific features of the female body. Neglect of these facts leads to negative manifestations at the level of sports achievements and on the health status of athletes in the range of the entire system of long-term sports training - from beginner to master of sports of international class [5, 12, 13, 16, 18, 19, 20].

One of the key periods of training of highly qualified athletes is the stage of pre-competitive training. Preceding the competitive one, it determines the result of all preliminary, long-term training work. During this period, the intensity of the load increases and the athlete begins to

participate in the first control and training starts. The main task here is to improve all the qualities, skills and abilities that guarantee readiness for the sporting achievements of all-rounders [10, 11, 17].

In this regard, it is at this stage of preparation, that the biorhythmological features of the female body should be carefully considered.

The purpose of the study is to identify the main directions of the planning of the training process for female athletes specializing in modern pentathlon, taking into account the biorhythmological features of their body. The developed training structure for the pre-competitive stage of the annual cycle was tested.

To achieve the purpose of the study we used the following **research methods**:

- generalization and analysis of scientific and methodological literature;
- pedagogical testing;
- questionnaire;
- pedagogical experiment;
- methods of mathematical processing of the obtained materials.

The analysis was carried out on the data of scientific and methodological literature relating to the training of qualified athletes specializing in modern pentathlon. The features of building the training process in women's sports were also identified.

Pedagogical observations were aimed at analyzing the peculiarities and features of the training process of female pentathlon athletes at different periods of preparation. The object of pedagogical observation was the volume and intensity of the training loads of qualified athletes in the pre-competitive training period.

The results of the study. The coaches ($n = 10$) involved in the preparation of athletes of various qualifications took part in the special questionnaire. It was carried out in order to study the basic approaches to planning the training process of female athletes specializing in modern pentathlon, taking into account the physiological characteristics of their body. The number of coaches was represented exclusively by male coaches, five of which have the highest category, and one obtains the title "Honored Coach of the Republic of Belarus". The coaching experience ranges from 1 year to 42 (an average of 28.6 years).

Analysis of questionnaires of coaches allowed to obtain the following data. Thus, the greatest contribution to the total result of modern pentathlon among women is made by such species as fencing and running and shooting. The smallest contribution is given by horseback riding.

To the question about choosing the optimal terms for the duration of the pre-competitive stage of training, the trainers answered almost the same way - at least 4 weeks.

The main task of the pre-competitive stage of training, according to the respondents (in rating order) is:

- increasing the level of technical preparedness;
- increase the level of physical fitness;
- increasing the level of mental preparedness.

Determining the predominant orientation of the training process at the pre-competitive stage, coaches give some preference to the types of activities that are leading for the athlete. In general, they believe that the emphasis in the work should be put on those types of activities that make the greatest contribution to the total result.

Answering the questions regarding the peculiarities and features of training girls, 73.7% of the experts noted that in their work they take into account the peculiarities of the female body (presence of OMC phases) when drawing up the plan for the female athletes; 6.2% do not take into such aspects account; 20.1% express an opinion on partial accounting, depending on the features of the cycle. More than 80% of the coaches surveyed consider it necessary to conduct training sessions in the menstrual phase, 12.3% said they did not see the need for it, and only about 7%

approached this issue strictly individually and situationally, depending on the athlete's well-being.

The respondents spoke about the optimal load in the menstrual phase of the OMC as follows. Thus, 49.7% of respondents believe that the training load during this period should decrease by more than 50%; 33.2% of trainers reduce the load by 30% of the maximum; only 17.1% do not change the planned volume depending on the physiological state athletes.

To the question: "In your opinion, which specific exercises can be used in the menstrual phase?" more than 50% of specialists answered that there should be imitation exercises of a technical nature, aimed at developing flexibility; 32.5% expressed an opinion that the exercises aimed at improvement of the general physical fitness are most effective in this situation; about 20% of respondents noted that at this stage the development of speed qualities is possible through running exercises.

All experts note the presence of psychophysiological changes occurring in the body of athletes in the menstrual and the premenstrual phases such as irritability, psychological imbalance, sometimes lethargy, apathy (affecting the training process), self-doubt, sometimes fear and unwillingness to participate in competitions.

It should be noted that, according to experts, improving the effectiveness of pre-competitive preparedness is possible by improving the biomedical stimulation of training activities and the modern system of active recovery through vitaminization, various types of massage and psycho-regulatory effects. It is important to optimize the structure and content of the training process, to implement a system of operational control over the condition of athletes throughout the entire pre-competition stage [7, 9, 10, 18].

The technology of the training process at this stage is one of the most important components of the realization of the athlete's potential accumulated during the course of many years of training. The main structural component of the technological scheme of the training process is its planning. It becomes especially important in regards to such a complex type of sport as the modern pentathlon.

An analysis of the literature data [1, 8, 9, 15] and planning documents allowed us to determine that the stage of precompetitive preparation of highly-qualified female athletes of pentathlon for the main competitions consisted of three microcycles: *retracting* - the purpose of which is to prepare the body for hard training work; *striking* - with a large total volume of exercise, high loads, the main task of which is to stimulate adaptation processes in the body, to solve the tasks of technical, tactical, physical, psychological and moral-volitional training. Lastly, the stage of preparation for the climax competitions ends with a *leading* microcycle, which is aimed at the full recovery and psychological adjustments of the athletes.

In practical activities of managing the training process of the pentathletes (men and women) of the higher categories at the pre-competition stage, the microcycle (a part of the mesocycle) is planned to consist of 17-18 training sessions. In 85% of cases the following ratio of activities in microcycles is used:

- Fencing: three trainings (one with a higher load, lasting up to 2.5 hours, one with an average load, duration of up to 2 hours and one with a low load, with increased intensity, lasting up to 1 hour);

- Riding: two trainings (one with a heavy load and duration of up to 1.5 hours, with overcoming 25-30 obstacles, the other with an average load of up to 1 hour and the number of obstacles up to 15-20;

- Swimming: up to five trainings (one with a heavy load and an increased volume of swimming distance, one with an average load and three trainings with a light load and a total swimming distance of up to 1200-1500 m);

- Shooting: up to five trainings (one with a heavy load and the number of shots up to 80, two trainings with an average load and the number of shots up to 40-60 and two trainings with a light

load and the number of shots up to 35-40);

– Cross running: three trainings (one with a heavy load and a duration of up to 60-70 minutes, one with an average load and duration of up to 1 hour and one with a small one, where it takes up to 35-40 minutes) [4].

Such a structure of the microcycle at the pre-competitive stage is planned for the entire period of preparation. Only volume and intensity parameters are adjusted, depending on the tasks of each microcycle (table 1).

Table 1

The ratio of types of training orientation at the stage of pre-competition training in the modern pentathlon

The number of training sessions in the microcycle					The total number of trainings
Fencing	Swimming	Shooting	Running	Riding	
3	5	5	3	2	18

Thus, the authors recommend prioritize the following parts of the modern pentathlon: shooting, fencing and partially swimming. The least attention is paid to training in running and horseback riding.

However, in our opinion, this approach had been effective before the rules of competitions were changed, when a combined type of pentathlon (4 segments of 800 meters alternating with shooting) was introduced. According to the authors, it accounts for more than 45% of the competitive result in women's modern pentathlon. Therefore, increasing the efficiency of running training for athletes specializing in modern pentathlon (taking into account gender characteristics) along with rational planning, is the main reserve for the growth of their sports results.

Based on a literature review, a survey of leading coaches and our own experience, we developed an experimental structure for the pre-competition training of qualified pentathlon athletes.

The pedagogical experiment was carried out on the basis of the Olympic training center for applied sports in the city of Gomel. It was done in order to determine the effectiveness of the proposed methodology (experimental structure of load distribution) and its influence on the result in individual parts of pentathlon. In total, 6 athletes of the highest qualification, masters of sports and masters of sports of international class took part in the pedagogical experiment. For the intergroup comparison, a control group of athletes was selected, conducting training according to the generally accepted methodology.

According to the developed structure, the ratio of the types of training orientation was changed: the number of training sessions of a running orientation was increased, classes that simulated the combined form of pentathlon (running, shooting) and horse riding were introduced. The number of training sessions in shooting has been reduced (table 2). We have also developed and included in the training process complexes of special and jumping exercises.

Table 2

Experimental ratio of types of training orientation at the stage of pre-competition training in the modern pentathlon (microcycle)

The number of training sessions in the microcycle						The total number of training
Fencing	Swimming	Shooting	Running training		Horse Riding	
			run	Combined relay		
3	5	2	4	2	3	18

The focus of fencing, swimming and horseback riding has remained the same. Running

preparation for the pre-competition stage is characterized by a significant decrease in the total running volume, using running on segments with a near-competitive or super-competitive speed, as well as a control run at a competitive distance. Also, athletes participated in competitions of a training nature.

Running training included cross-country running and running on segments from 600m (with a speed higher than competitive) to 1000m (with a speed lower than competitive), as well as a control run at a competitive distance.

At the precompetitive stage, with an average run of about 90 km per microcycle, the anaerobic run amounted to more than 5% of the total running load (TRL); the run in the mixed power supply regime was about 10% of the TRL, respectively, against 40% of the TRL in the aerobic developing regime and more than 45 % aerobic-regenerative regime (table 3).

We also took into account the biorhythmological cycle of athletes, the “unloading” week coincided with the OMC phase, in which its physical performance is at a relatively low level (premenstrual phase), adding to them the days of the next menstrual phase (with the most common 28-day MC it is 26-28 day of one MC and 1-4 - the next). All other days of the cycle, with the exception of ovulation days (13-15 days), when the load decreased again, striking microcycles were offered to the athletes.

In order to determine the effectiveness of the developed methodology, we carried out a comparative analysis of the results of the control competitions in the pentathlon of the experimental and control groups (table 4).

Table 3

Indicators of running training loads of athletes of the experimental group in the pre-competition period (microcycle)

Indicators	X
total running load (TRL), km	88
% of TRL	100
Aerobic-regenerative, km	40,13
% of TRL	45,6
Aerobic-developing, km	35,2
% of TRL	40
Mixed, km	8,8
% of TRL	10
Anaerobic, km	4,75
% of TRL	5,4

The results of the control swimming competitions in the experimental group were 264.5 ± 1.35 points. In the control group they were lower - 267.5 ± 1.36 points. In the laser-run (4x800 running and shooting), athletes of the experimental group showed the best results: 532.25 ± 2.04 points. In the control group they corresponded to 512.25 ± 1.6 points.

It can be concluded that, based on the analysis of the data obtained in swimming and laser-run, the statistical significance of differences in favor of the experimental group was revealed. At the same time, in riding and fencing, statistical reliability (for a 5% level of significance of differences) was not identified.

Table 4

Results of control competitions in individual types of pentathlon, points

Pentathlon Discipline	Experimental Group $M_1 \pm \sigma$	Control group $M_1 \pm \sigma$	Reliability of differences, p
Fencing	254,25±1,65	258,5±1,32	>0,05
Swimming	264,5±1,35	267,5±1,36	<0,05
Horse Riding	281,5±1,23	278,5±1,03	>0,05
Laser-run (shooting and running)	532,25±2,04	512,25±1,6	<0,05

Discussion. A questionnaire of leading specialists in the field of training of qualified pentathletes indicates the need to develop a generally accepted concept for planning the training process of sportswomen. It should be based on the interdependence of focus and volume training effects from the optimal state of the athlete associated with the physiological characteristics of the female body.

In addition, the changed competition rules require specialists to introduce progressive approaches aimed at optimizing the training system for pentathletes. In this aspect, special attention should be paid to improving the efficiency of running training, which is the main reserve for the growth of sports results.

The studies [11], which determine the contribution of results of fencing, swimming, show jumping and “combined type” to the final result of the modern pentathlon showed, that result of the combined relay constitute the largest part of the competitive result to the final number of points. On average, the values are at the level of 40 or more percent. Coaches working with athletes who specialize in modern pentathlon should pay particular attention to improving the effectiveness of running training. The latter, at present, due to a change in the rules of the competition, is the main reserve for the growth of their sports results in this sport. However, this should be done taking into account the individual characteristics of the sportswomen’s OMC.

Conclusions and prospects for further research. The optimal structure of the correlation of types of training orientation in the pre-competitive stage of preparation is experimentally substantiated. Thus, the microcycle should include the following stages: fencing and horseback riding (3 training sessions each), swimming (5 lessons), shooting (2 lessons), running training (6 training sessions, 2 of which are combined relay). Also, the training process should include complexes of special athletics exercises.

In the course of experimental studies, it was proved that specialists in the precompetitive preparation of qualified pentathlon athletes should individualize the training process and take into account the correspondence of the dynamics of training loads to rhythmic, wave-like changes in the functional state caused by the OMC.

The next stage of our research will be the introduction of our technology of individualization of the developed training structure in the pre-competitive stage of the annual cycle into the training process of qualified pentathlon teams of Belarus.

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Відомості про авторів:

Севдалев С.В.; orcid.org/0000-0003-0780-9075; sevdalev@mail.ru; Заклад освіти Гомельський державний університет ім. Ф. Скорини, Республіка Білорусь

Врублевський Є.П.; orcid.org/0000-0001-5053-7090; vru-evg@yandex.ru; Заклад освіти Гомельський державний університет ім. Ф. Скорини, Республіка Білорусь; Зеленогурський університет, Зелена Гура, Польща

Кожедуб М.С.; orcid.org/0000-0001-5715-1182; marina.888.k@yandex.ru; Заклад освіти Гомельський державний університет ім. Ф. Скорини, Республіка Білорусь