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ORIGINAL SCIENTIFIC ARTICLE

OPTIMIZATION OF THE TRAINING PROCESS OF HIGHLY QUALIFIED ATHLETES IN ATHLETICS COMBINED EVENTS AT THE STAGE OF DIRECT PREPARATION FOR COMPETITIONS

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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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Abstract

The purpose of the study was to develop an optimal model of the stage of direct preparation for competitions of highly qualified multieventers in athletics and experimentally justify its effectiveness.

Materials and methods. 5 highly qualified multieventers, whose sports qualification is the Master of Sports of Ukraine, participated in the pedagogical experiment. The average age of the participants was (M±SD) 25.2±1.79 years. Research methods: theoretical analysis and generalization of data from literary sources; pedagogical experiment (the study was conducted from 2019 to 2021 according to the scheme of a sequential pedagogical experiment: from 2019 to 2020 – the ascertaining stage and from 2020 to 2021 – the formative stage); pedagogical observation of training and competitive activities; pedagogical testing (running 60 m from a high start, running 2 × 200 m with a rest interval of 1 min, triple jump from a standing position, throwing a ball with two hands from below on range, the running version of the $PWC_{170(V)}$ test was used for estimation of physical capacity and aerobic productivity of athletes); mathematical and statistical methods.

Results. The total amount of training work of the studied multieventers at the stage of the formative experiment was reduced to 3148 min, compared to the ascertainment stage (4999 min), however, their intensity increased to an average of 6.11 points/min, compared to 5.72 points/min at the ascertainment stage. We managed to optimize the training process due to the developed models of microcycles at the stage of direct preparation for competitions, in which attention was focused on the leading types of each of the multieventers.

Conclusions. Reducing the amount of load at the stage of direct preparation for competitions with a simultaneous increase in their intensity allowed the athletes to reach the peak of their sports form, as evidenced by the results of the main competitions of each of the athletes. The analysis of indicators of physical and functional fitness of highly qualified track and field athletes made it possible to establish that most of the results at the stage of the formative experiment improved statistically in a reliable way by an average of 2.6-6.5 %, which confirms the effectiveness of the proposed 8-week model of the stage of direct preparation for the competition and allows to recommend it for practical use in the training process of multieventers at the stage of maximum fulfillment of individual capabilities.

Keywords: basic mesocycle, control-preparatory mesocycle, pre-competition mesocycle, combined events, multieventers, training process, load value, load amount, load intensity.

Introduction

The most important period in the training of highly qualified athletes is the stage of direct preparation for competitions. In the traditional planning of the training process, coaches and athletes often focus on the competitive results they are trying to achieve in a certain calendar year and plan the preparation for these competitions accordingly. Recently, in international practice, at all stages of long-term training, an athlete is allowed to participate in competitions during the year, but training is adjusted to the long-term needs of the athlete and not directly to secondary competitions (Nedoshchak & Sukhynyn, 2013; Kasper, 2019; Jeffreys & Moody, 2021).

The introduction into the structure of annual training at a special stage – direct preparation for the most important competitions which for a long time was associated with the concept of "narrowing" or "tapering" (according to the terminology of foreign authors), provides for the creation of conditions for full recovery after previous loads (Spilsbury, 2021; Ouergui et al., 2022; Winwood et al., 2022). According to this understanding of the essence of the stage of direct preparation and depending on the previous load, its content is built and the duration and magnitude of the load are determined, and the effectiveness and course of restorative reactions are evaluated (Bobrovnik, 2014; Ritchie, Allen & Kirkland, 2018; Botonis, Toubekis & Platanou, 2019). Determining the optimal amount of load during the construction of a "narrowing" is carried out exclusively by foreign authors based on such indicators as the volume and intensity of loads, as well as the number of training sessions in certain structural formations of the training process (Le Meur, Hausswirth & Mujika, 2012; Bazyler et al., 2017; Bompa & Buzzichelli, 2018).

Solving specific tasks in the final weeks before the main starts requires establishing optimum amounts of training work and load dynamics, combining classes with training loads of different orientations and sizes, using rest, restorative means in the form of a complete complex. It is also necessary to provide operational and ongoing control over the course of recovery and adaptation processes (Kutek & Akhmetov, 2018; Bezmylov et al., 2022). Taking into account the mentioned problems, the domestic authors developed the most rational 8-week stage of direct preparation for the main competitions, in which three mesocycles are allocated (2week basic, 3-week special preparation, 3-week pre-competition) with strictly defined tasks and corresponding them by the content of training. Direct preparation for the rest of the year's competitions is short-term and takes the form of a competitive microcycle of 5-6 to 8-9 days, in which the first 3-5 days are used for full recovery, and the next 2-4 days are devoted to pre-start training and participation in competitions (Platonov, 2018, 2020).

Positive results of using the 8-week model of the stage of direct preparation for major competitions have been noted in various sports. In athletics, the use of short-term "retraining" is practiced, in which direct preparation for the main competitions is carried out mainly at the expense of restorative means in the absence of a focus of the training process for the purpose of achieving maximum deferred training effect (Bora, 2012; Kozlova, Wei & Kozlov, 2020). At the same time, no special studies on this topic in athletics combined events were found in the available sources.

Taking into account the continuous development of the system of training athletes in athletics, the variety and scale of competitions, significant financial and rating incentives (Adamchuk et al., 2021; Bilous & Kononenko, 2022; Pahan & Singh, 2022), the problem arises of applying such a model of the stage of direct preparation for competitions in athletics combined events, the content of which will consist of the optimal parameters of training loads and which in the final result will ensure the successful performance of athletes at the main competitions.

Research hypothesis: it was assumed that the optimization of the training process on the stage of direct preparation for competitions of highly qualified multieventers will allow targeted managerial influences on the adaptive resources of athletes for the formation of training effects and the achievement of high sports results.

The purpose of the study was to develop an optimal model of the stage of direct preparation for competitions of highly qualified multieventers in athletics and experimentally justify its effectiveness.

Materials and methods

Participants

5 highly qualified multieventers, whose sports qualification is the Master of Sports of Ukraine participated in the pedagogical experiment. The average age of the participants was (M±SD) 25.2±1.79 years. The study was approved by the ethics committee of Mykhailo Kotsiubynskyi Vinnytsia State Pedagogical University, and all procedures were in accordance with the Declaration of Helsinki. Informed consent for participation in the experiment was obtained from the participants.

Research organization

The study was conducted from 2019 to 2021 according to the scheme of a sequential pedagogical experiment: from 2019 to 2020 – the ascertaining stage and from 2020 to 2021 – the formative stage. After conducting the ascertaining stage of the experiment, it was established that was 8-week stage of direct preparation, in which three mesocycles are distinguished: basic, control-preparatory and pre-competition, was the most optimal (Fig. 1).

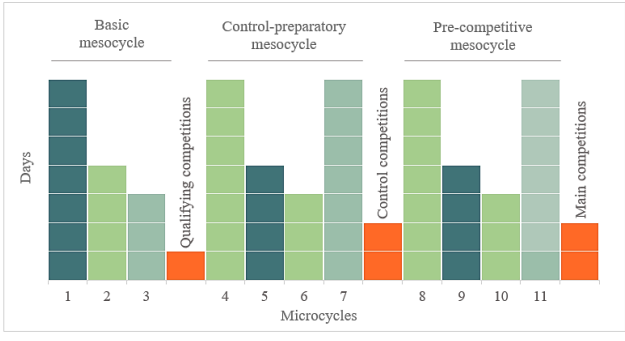

Fig. 1. The structure of the 8-week stage of direct preparation for competitions of highly qualified multieventers (summer season): – shock microcycle; – recovery microcycle; – preliminary microcycle; – competitions

Table 1. Main load parameters in mesocycles at the stage of direct preparation for competitions of highly qualified multieventers (summer season)

	Load parameters	Mesocycles		
		Basic mesocycle (14 day)	Control-preparatory mesocycle (21 day)	Pre-competitive mesocycle (21 day)
Technical preparation, min	TP-1 (hurdling)	125	138	122
	TP-2 (high jumps)	60	84	65
	TP-3 (long jumps)	65	73	55
	TP-4 (pole vault)	135	127	82
	TP-5 (shot put)	65	55	52
	TP-6 (discus throw)	40	63	40
	TP-7 (javelin throw)	55	79	45
	Σ of the training work, min	545	619	461
Physical preparation, min	S (speed)	63	95	105
	S-1 (speed endurance)	45	55	50
	SP (speed and strength training)	156	189	178
	GPT (general physical training)	68	105	98
	P (power training)	106	96	126
	E (endurance)	48	25	15
	Σ of the training work, min	486	565	572
Σ of the training work, min		1031	1185	1033
VLC*, points		6625	7379	5961
ICtl**, points/min		6.03	5.84	6.15

Notes: * VLC – value load coefficient was calculated as a result of multiplication of the duration of the exercise by its intensity in points depending on the heart rate (Kostiukevych, Shchepotina et al, 2020): intensity of exercise with the heart rate 114 bpm was evaluated in 1 point; 120 bpm – 2 points; 126 bpm – 3 points; 132 bpm – 4 points; 138 bpm – 5 points; 144 bpm – 6 points; 150 bpm – 7 points; 156 bpm – 8 points; 162 bpm – 10 points; 168 bpm – 12 points; 174 bpm – 14 points; 180 bpm – 17 points; 186 bpm – 21 points; 192 bpm – 25 points; 198 bpm – 33 points. ** ICtl – intensity coefficient of training load was determined as a ratio between VLC and the duration of a training session in minutes (Adamchuk et al, 2021)

The main parameters of the training work of highly qualified multieventers at the stage of direct preparation for the competition are given in the table. 1. In general, we note that a large volume of training work was performed in the two-week basic mesocycle, which was aimed at improving speed and strength abilities and adjusting technical elements from all combined events. The control-preparatory mesocycle began with active rest after qualifying competitions, followed by intense special training (85-90% of maximum performance). In the following days, the loads were reduced to prepare the athletes for performance in control competitions. Active recreation was planned at the beginning of the pre-competition mesocycle. Further, the loads gradually increased and 10 days before the main competition, training work with overload was performed in order to reach the peak of supercompensation.

The outlined content of the stage of direct preparation for the competition was implemented through the development and implementation of appropriate models of microcycles. As can be seen from fig. 1, the structure of the stage consisted of preliminary, shock and recovery microcycles. The structure and content of 7-day shock, preliminary and recovery microcycles are presented in detail in previous studies (Adamchuk et al., 2021). As a sample, we present the model of a 4-day shock microcycle (Table 2).

Control of the training process at the ascertaining stage of the pedagogical experiment was carried out using the methods of pedagogical observation and timing of training work, during which the heart rate of the studied multieventers was determined using a POLAR RS800CX heart rate monitor. This made it possible to establish the volume, magnitude and intensity of loads during the studied period.

The indicators of the physical and functional fitness of the sportsmen under study were the criteria for the effectiveness of building the training process of multieventers during the ascertainment and formative stages of the experiment. Using the method of pedagogical testing, the following indicators were determined (Adamchuk et al, 2021; Kostiukevych et al., 2021): running 60 m from a high start, running 2 × 200 m with a rest interval of 1 min (the total time to overcome two segments was determined), triple jump from a standing position, throwing a ball with two hands from below on range. All tests were carried out according to standard methods.

The running version of the $PWC_{170(V)}$ test was used for estimation of physical capacity and aerobic productivity of athletes: according to the method for conducting a run-based variant of the test $PWC_{170(V)}$ the athletes performed two 5-minute run loads by overcoming the distances of

Table 2. Model of the 4-day shock microcycle of the spring-summer training cycle (speed-power type)

Groups of exercises	Days of microcycle				In all
	1	2	3	4	
General physical training, min	GPT 1.1(a)–20^4	GPT 1.1(a)–20^4	GPT 2.1(a)–25^4	GPT 1.2 – 25^4	90
Special physical preparation, min	S 1.2 – 20^{13}	P-20^6 P-1.5(b) – 20^8 SP1.5(b) – 12^6	S-1.9 – 10^{13} SP 1.7 – 20^5	P-2.2 – 20^6	P–60 SP–32 S–20 S1–10
Technical preparation, min	TP-1.15 – 30^{13} TP-5.1(b) – 10^4 TP-5.2(b) –20^5	TP-4.3(a) – 45^7 TP-6.1 – 10^5 TP-6.2 – 20^6	TP-3.7 – 20^8 TP-7.1(b) – 10^4 TP-7.2(b) – 20^5	TP-1.3 – 10^5 TP-2.3 – 20^8	TP-1–40 TP-2–20 TP-3–20 TP-4–45 TP-5–30 TP-6–30 TP-7–30
Σ of the training work, min	100	147	105	75	427
VLC, points	870	917	630	430	2847
ICtl, points/min	8,70	6,23	6,0	5,73	6,67

Notes: record of the exercise like TP-3.7 – 20^8 means: TP-3.7 – code of the training exercise; 20^8 – duration of exercise in minutes (20) and its intensity in points depending on the heart rate (8)

700-900 and 1100-1300 m accordingly, with their heart rate being recorded at the end of the first and second load (the period of rest between run loads made 5 minutes). $PWC_{170(V)}$ was determined using the formula:

$$PWC_{170}(V) = V_1 + (V_2 - V_1)\frac{170 - f_1}{f_2 - f_1} \quad , (1)$$

whereas: V_1 and V_2 represent run speed during the first and second run loads (determined as a ratio between the distance length and the time for overcoming the distance), m/s;
f_1 and f_2 represent heart rate immediately after the first and second run load, bpm.

The following formula was used to convert $PWC_{170(V)}$ in m/s into PWC_{170} in kgm/min:

$PWC_{170}=417 \cdot PWC1_{70(V)}-83$, (2)

Absolute index of maximum oxygen consumption (VO_2max, ml/min) was determined using the formula:

$VO_2max=1,7 \cdot PWC_{170}+1240$, (3)

Relative index of maximum oxygen consumption ($VO_2max(rel)$, ml/min/kg) was determined as a ratio of an absolute index to the body mass of the studied athletes.

Pedagogical testing of athletes was carried out at the beginning and at the end of the stage of direct preparation for competitions in the process of performing the main training work.

Statistical analysis

Descriptive statistics (Albert et al., 2017; Byshevets et al., 2019; Kostiukevych, Lazarenko et al., 2020) were used during the mathematical processing of the results of pedagogical testing, which involved determining the mean value (M) and the standard deviation (SD). Statistical reliability in the difference of results at the beginning and at the end of the ascertaining and formative stages of the pedagogical experiment was determined by the non-parametric Wilcoxon T-test. Differences between groups were considered statistically significant at $p<0.05$.

Results

Summarizing the results of pedagogical observation and timing of training work allows us to determine the dynamics of volumes (Fig. 2), as well as the magnitude and intensity (Fig. 3) of the training loads of the studied multieventers during the ascertaining and formative stages of the pedagogical experiment.

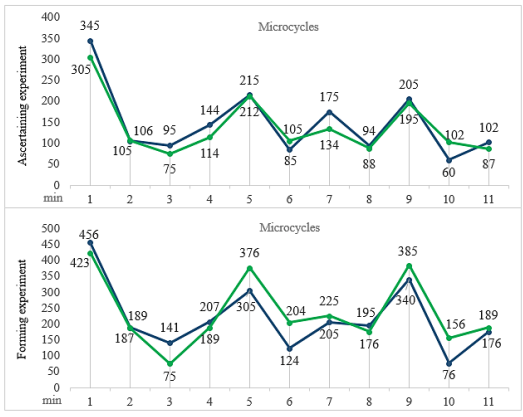

Fig. 2. Dynamics of volumes of the training loads of the studied multieventers during the ascertaining and formative stages of the pedagogical experiment: ▬ – special physical preparation; ▬ – technical preparation

The duration of training work in different microcycles at the ascertaining and formative stages differed. The largest amount of training work was found in shock microcycles (1st, 5th and 9th) – within 681-879 min at the stage of ascertaining experiment and within 400650 min at the stage of formative experiment. In addition, it is precisely in these microcycles that the highest coefficients of the size and intensity of the training load were found – respectively within the range of 4120-5283 points and 6.01-6.57 points/min at the stage

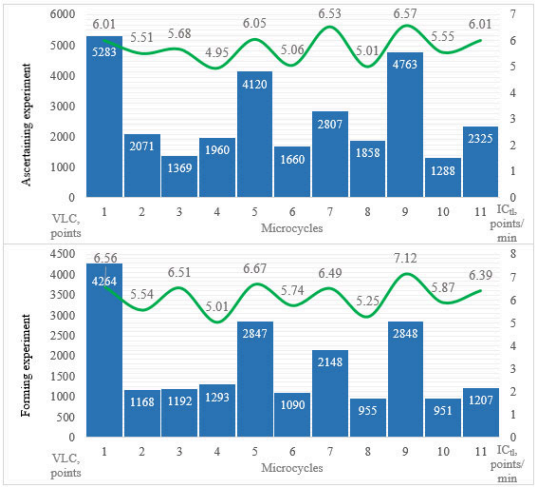

Fig. 3. The magnitude and intensity of the training loads of the studied multieventers during the ascertaining and formative stages of the pedagogical experiment: ■ – VLC – value load coefficient; ▬ – ICtl – intensity coefficient of training load

of the ascertainment experiment and within the range of 2847-4264 points and 6.56-7.12 points/min at the stage of the formative experiment. Such a structure and content of the training process in impact microcycles are connected with the need to solve the tasks of physical and technical training of athletes.

The shortest duration of training work in recovery microcycles (2nd, 4th, 6th, 8th and 10th) at the stage of the ascertaining experiment within 232-396 minutes at the stage of the formative experiment – within 162-258 minutes. Solving the tasks of restoring the functional systems of the athletes' bodies in these microcycles after significant loads of shock microcycles and competitions determined the lowest indicators of the magnitude and intensity of the loads – within 1288-2071 points and 4.95-5.55 points/min, respectively, at the ascertainment stage of the experiment and within 951-1293 points and 5.01-5.87 points/min at the stage of formative experiment.

Preliminary microcycles (3rd, 7th and 11th) were used before the control and main competitions. They were characterized by a small amount of training work – 216430 min at the stage of the ascertainment experiment and 170-309 min at the stage of formative experiment. In order to avoid overtraining and exhaustion of the functional systems of the sportsmen's body before the competition, the magnitude and intensity of the loads were smaller than the impact microcycles – respectively 13692807 points and 6.34-6.53 points/min at the stage of the ascertainment experiment and 1192-2148 points and 5.95-6.39 points/min at the stage of the formative experiment, and the training process was aimed at ensuring the best condition and high performance of the athletes before the competition.

The total amount of training work of the studied multieventers at the stage of the formative experiment was reduced to 3148 min, compared to the ascertainment stage (4999 min), however, their intensity increased to an average of 6.11 points/min, compared to 5.72 points/min at the ascertainment stage.

As already mentioned, the criteria for the effectiveness of the training process were the indicators of the physical and functional readiness of the multieventers and their dynamics at the stages of the pedagogical experiment. Pedagogical testing was carried out in shock microcycles in the process

Table 3. Indicators of physical and functional preparedness of multieventers at the stage of direct preparation for summer season competitions at different stages of the experiment

Indicators of physical and functional fitness	Research phase	weekend data		Final data		Changes (ΔM)		T	p
		M	SD	M	SD	Absolute	%		
Running for 60 m, s	AE	6.84	0.07	6.76	0.09	0.08	1.2	2	>0.05
	FE	6.82	0.06	6.65	0.08	0.17	2.6	0	<0.05
Running 200 m and 200 m after 1 min of rest, s	AE	49.75	1.18	49.69	1.00	0.06	0.1	3	>0.05
	FE	49.72	0.67	49.04	0.52	0.68	1.4	1	>0.05
Triple jump from a place, m	AE	8.90	0.45	9.15	0.39	0.25	2.8	1	>0.05
	FE	8.85	0.28	9.38	0.31	0.53	6.0	0	<0.05
Throwing a shot (6kg) with two hands from below, m	AE	16.05	0.48	16.56	0.44	0.51	3.2	1	>0.05
	FE	15.94	0.34	16.98	0.59	1.04	6.5	0	<0.05
PWC_{170} (V), m/s	AE	4.77	0.68	4.94	0.71	0.17	3.4	0	<0.05
	FE	4.81	0.56	5.09	0.42	0.28	5.8	0	<0.05
PWC_{170}, kgm/min	AE	1906.0	283.6	1974.4	295.3	68.4	3.4	0	<0.05
	FE	1921.3	232.6	2048.7	174.1	127.4	6.6	0	<0.05
VO_2max, ml/min	AE	4480.2	482.2	4596.4	502.0	116.2	2.5	2	>0.05
	FE	4506.3	395.4	4722.7	295.9	216.4	4.6	0	<0.05
VO_2max (rel), ml/min / kg	AE	53.8	8.0	55.1	6.4	1.3	2.4	2	>0.05
	FE	54.1	6.7	56.6	4.0	2.5	4.6	0	<0.05

Notes: PWC_{170}(V) is a running version of the test; PWC_{170} is an indicator of physical working capacity; VO_2max is an absolute indicator of maximum oxygen consumption; VO_2max(rel) is a relative indicator of maximum oxygen consumption; AE – ascertaining experiment; FE – forming experiment

of performing the main training work. Since the studied indicators at the beginning of the ascertaining and formative stages of the experiment did not differ statistically significantly ($p>0.05$), this gave us grounds for continuing the pedagogical experiment and obtaining objective data at the end.

Analysis of the dynamics of indicators of physical and functional fitness of multieventers at the stages of the pedagogical experiment allows us to note positive dynamics (Table 3). At the same time, more pronounced changes were revealed by the results of the formative stage of the experiment. In particular, we note a statistically significant improvement in indicators characterizing the level of manifestation of speed abilities, where the increase in results was 2.6 % ($p<0.05$). In test exercises reflecting speed and strength abilities, the increase in results ranged from 2.8 to 6.5 % ($p<0.05$). We attribute the increase in these indicators to the fact that at the stage of direct preparation for the main competitions, the training work focused on leading physical qualities. Also, the increase in results occurred due to a decrease in the amount of energy-consuming exercises, which made it possible to "decrease" the athletes' load before the competition.

During the formative stage of the experiment, we also noted positive dynamics in the indicators of speed endurance, where an increase of 1.4 % was observed, but without a significant difference ($p>0.05$). We associate this with the fact that the test exercise was performed 10 days before the main competition. This corresponded to the time frame when athletes needed to maintain an optimal level of fatigue to prevent overtraining.

In the indicators characterizing the functional preparedness of multieventers, positive dynamics were revealed both during the ascertaining and formative stages of the experiment. In particular, during the formative stage, we note a statistically significant increase in results in indicators of physical performance of multieventers within the range of 5.8-6.6 % ($p<0.05$), and in indicators of aerobic productivity – 4.6 % ($p<0.05$).

Participation in the main competitions of the summer season showed positive dynamics of the results in the decathlon of highly qualified athletes who were involved in the pedagogical experiment (Fig. 4).

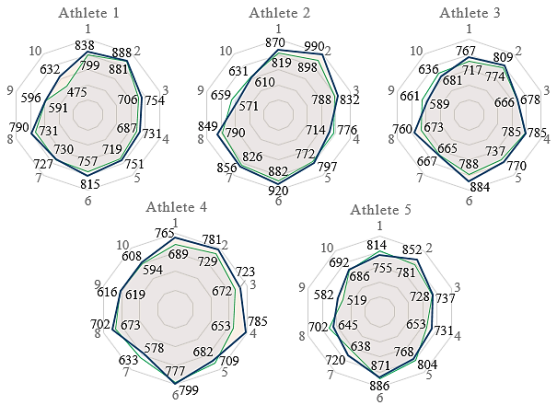

Fig. 4. The results of the decathlon of highly qualified multieventers at the stages of ascertaining and formative experiments, points: 1 – 100 meters; 2 – long jump; 3 – shot put; 4 – high jump; 5 – 400 meters; 6 – 110 meters hurdles; 7 – discus throw; 8 – pole vault; 9 – javelin throw; 10 – 1500 meters

The analyzed data serve as a sufficient reason to believe that the influence of the training program and the microcycle program at the stage of direct preparation for the competition allowed the athletes to reach the peak of their sports form and demonstrate high sports results.

Discussion

Despite its relatively short duration, the stage of direct preparation for important competitions and, especially, its final pre-competition mesocycle, plays a major role in achieving the final result of long-term work and success in competitions. This stage solves such defining tasks as maintaining the achieved level of training, improving training movements, checking and clarifying technical elements, psychological preparation for the competition, providing active rest before the competition (Platonov, 2018; Chojnicki, Smoleńska & Muszkieta, 2021; Sobol et al., 2021). The implementation of the stage of direct preparation for the main competitions of highly qualified athletes has shown its effectiveness in various sports (Botonis, Toubekis, Platanou , 2019; Ouergui et al., 2022; Winwood et al., 2022), including athletics (Bora, 2012; Bobrovnik, 2014; Spilsbury, 2021), but it has not found its theoretical and methodological justification in combined events, which is technically the most difficult and physically demanding track and field discipline. In this regard, the models of the structure and content of the outlined stage, micro- and mesocycles reflected in the study represent a significant contribution to the scientific work on the problem of training athletes in athletics combined events. According to the results of the conducted research, the expediency of using the 8-week model of the stage of direct preparation for competitions in the annual training cycle of highly qualified multieventers was confirmed (Bompa & Buzzichelli, 2018; Platonov, 2018).

Management of the training process of highly qualified multieventers in relation to the assessment of their functional state in the context of increasing physical loads requires practical justification. The principle of supercompensation has become basic for sports training at the stage of direct preparation for major competitions. According to the theory of supercompensation, several concepts of training during the "tapering" period were developed, of which the most acceptable was the modified scheme of the sum of training loads, which involves the accumulation of fatigue from several training sessions in the supercompensation phase and full recovery after reaching a certain level of the total load. At the current stage, the use of the 8-week model of the stage of direct preparation for the main competitions dominates, which provides for consistent preparation for overload , the creation of conditions for the development of the delayed training effect and the achievement of an adaptation jump before the main competitions (Bora, 2012; Bompa & Buzzichelli, 2018; Platonov, 2018). In the context of the above, the presented 8-week model of the stage of direct preparation for competitions of highly qualified athletes in athletics combined events substantiates the practical mechanism of timely implementation of the supercompensation phase in a responsible sports competition. Such an effect was achieved due to the optimization of training loads. Reducing the volume of physical exertion and increasing its intensity allowed highly qualified multieventers to reach their peak

sports form and to generate additional reserves in the body at the stage of direct preparation for competitions.

We managed to optimize the training process due to the developed models of microcycles at the stage of direct preparation for competitions, in which attention was focused on the leading types of each of the multieventers. An individual approach to the selection of technical and physical training was carried out, but at the stage of the formative experiment we reduced the number of exercises with a large amount of load, which "relieved" the multieventers from excessive training work. Thus, it was confirmed the expediency of paying the main attention to the improvement of performance in the types of combined events, to which the athlete has a pronounced tendency to develop, and mainly the supporting nature of the training in relation to the rest of the combined events types (Dobrynska, 2015; Chapon, Navarro & Edouard, 2022).

Appropriate application of loads of different orientation influenced the formation of adaptive reactions and the development of sports form. Based on the analysis of the average indicators of the load intensity factor at the stage of direct preparation for the competition, its wave-likeness is well observed. The distribution of volume and intensity was carried out with the provision of a wave-like alternation of training loads and recovery. Emphasis was done on the development of the basic components of special physical training and the main technical elements of the leading types of each multieventers. At the stage of the formative experiment, a uniform load distribution was implemented in individual types of combined events with a reduction in the duration of daily training by 20-30 %.

In general, the obtained results also significantly complement the existing scientific work on the rational distribution of training loads of highly qualified athletes at the stage of direct preparation for competitions (Nedoshchak & Sukhynyn, 2013; Kutek & Akhmetov, 2018; Platonov, 2018).

Conclusions

1. For highly qualified multieventers, the most optimal is an 8-week stage of direct preparation for the main competitions, which includes impact, recovery and water microcycles of different durations, depending on the competition calendar.

2. Reducing the amount of load at the stage of direct preparation for competitions with a simultaneous increase in their intensity allowed the athletes to reach the peak of their sports form, as evidenced by the results of the main competitions of each of the athletes.

3. The analysis of indicators of physical and functional fitness of highly qualified multieventers made it possible to establish that most of the results at the stage of the formative experiment improved statistically in a reliable way by an average of 2.6-6.5%, which confirms the effectiveness of the proposed 8-week model of the stage of direct preparation for the competition and allows to recommend it for practical use in the training process of multieventers at the stage of maximum fulfillment of individual capabilities.

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Conflict of interests

The authors state that there is no conflict of interests.

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ОПТИМІЗАЦІЯ ТРЕНУВАЛЬНОГО ПРОЦЕСУ ВИСОКОКВАЛІФІКОВАНИХ СПОРТСМЕНІВ У ЛЕГКОАТЛЕТИЧНОМУ БАГАТОБОРСТВІ НА ЕТАПІ БЕЗПОСЕРЕДНЬОЇ ПІДГОТОВКИ ДО ЗМАГАНЬ

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 10 с., 3 табл., 4 рис., 30 джерел.

Метою дослідження було розробити оптимальну модель етапу безпосередньої підготовки до змагань висококваліфікованих багатоборців у легкій атлетиці й експериментально обґрунтувати її ефективність.

Матеріал і методологія. У педагогічному експерименті брали участь 5 висококваліфікованих багатоборців, спортивна кваліфікація яких – Майстер спорту України. Середній вік учасників становив (M±SD) 25,2±1,79 років. Методи дослідження: теоретичний аналіз і узагальнення даних літературних джерел; педагогічний експеримент (дослідження проводилося з 2019 по 2021 рр. за схемою послідовного педагогічного експерименту: з 2019 по 2020 рр. – констатувальний етап і з 2020 по 2021 рр. – формувальний етап), педагогічне спостереження за тренувальною та змагальною діяльністю; педагогічне тестування (біг 60 м з високого старту, біг 2×200 м з інтервалом відпочинку 1 хв, потрійний стрибок з місця, метання ядра двома руками знизу на дальність, біговий варіант тесту $PWC_{170(V)}$ використовувався для оцінки фізичної працездатності й аеробної продуктивності організму); математико-статистичні методи.

Результати. Загальний обсяг тренувальної роботи досліджуваних багатоборців на етапі формувального експерименту був зменшений до 3148 хв, порівняно з констатувальним етапом (4999 хв), однак збільшено їх інтенсивність у середньому до 6,11 бал/хв, порівняно з 5,72 бал/хв на констатувальному етапі. Нам вдалось оптимізувати тренувальний процес за рахунок розроблених моделей мікроциклів на етапі безпосередньої підготовки до змагань, у яких акцентувалась увага на провідні види кожного з багатоборців.

Висновки. Зменшення обсягів навантаження на етапі безпосередньої підготовки до змагань з одночасним збільшенням їх інтенсивності дало змогу вийти спортсменам на пік своєї спортивної форми, про що свідчать результати головних змагань кожного зі спортсменів. Аналіз показників фізичної та функціональної підготовленості висококваліфікованих легкоатлетів-багатоборців дав змогу встановити, що більшість результатів на етапі формувального експерименту статистично достовірно покращились у середньому на 2.6-6.5 %, що підтверджує ефективність запропонованої 8-тижневої моделі етапу безпосередньої підготовки до змагань і дозволяє її рекомендувати для практичного застосування в тренувальному процесі багатоборців на етапі максимальної реалізації індивідуальних можливостей.

Ключові слова: базовий мезоцикл, контрольно-підготовчий мезоцикл, передзмагальний мезоцикл, легкоатлетичне багатоборство, багатоборці, тренувальний процес, величина навантаження, обсяг навантаження, інтенсивність навантаження.

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