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Dynamics of indicators of motor capabilities of young female athletes in different phases of the ovarian-menstrual cycle

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Abstract. The results of the generalisation of the training experience of young female track and field athletes show that taking into account the biological features of the female body in sports practice consists, mainly, in the application of a smaller amount of training load. At the same time, cyclical changes in the level of manifestation of physical qualities, which are due to the phases of the ovarian-menstrual cycle, are not taken into account. Therefore, the purpose of the study was to study the dynamic indicators of the motor capabilities of young multi-athletes during the ovarian-menstrual cycle. To realise the established goal, the following research methods were used: analysis, systematisation and generalisation of the data of literary sources on the studied issues; pedagogical (declarative experiment, testing); sociological (questionnaires); methods of mathematical statistics. 23 female track and field athletes aged 17-18 took part in the study. The level of motor capabilities of the subjects was determined on the days that correspond to a certain phase of the menstrual cycle. The dynamics of indicators of physical work capacity, strength, speed-strength abilities, as well as speed and speed endurance were determined. It was found out that the level of manifestation of the mentioned indicators in female athletes during the ovarian-menstrual cycle is not constant and changes in accordance with the phases of the cycle and has a heterochronic character. The lowest level of physical efficiency, strength, speed and strength abilities, speed and speed endurance was observed in the premenstrual and menstrual phase of the ovarian-menstrual cycle, which determines the necessity of reducing the volume of training load in the last (fourth) week of the cycle. The highest level in the cycle of manifestation of motor abilities of girls-athletes is characteristic of the postmenstrual and postovulatory phase, which allows for the planning the maximum physical activity in this period

Keywords: biological features; female body; multi-athletes girls; physical capacity; physical abilities

Introduction

There is an increase in the skills of young female track and field athletes, which is primarily related to an increase in the volume of training loads. The increase in physical activity is one of the conditions for increasing the effectiveness of the training process. However, an equally important condition is the optimisation of the construction of its process. One of the ways to solve this problem can be the construction of training sessions for young female athletes, taking into account cyclical changes in the state of sexual function and the body as a whole, which determine the peculiarities of the individual ovarian-menstrual cycle (OMC). The analysis of literary sources shows that much attention is paid to the problem of women's sports. A number of studies are devoted to the features of muscular work capacity in adult female athletes, which are caused by changes in the functional state of their bodies. Thus, L. Shakhlina (2020) scientific investigations are devoted to the current problems of sports physiology and sports medicine – the adaptation possibilities of the female body to large physical and psycho-emotional loads in modern high-achievement sports. The results of the author's many years of comprehensive research reveal the functional capabilities of female athletes in different phases of the menstrual cycle, as well as the physiological mechanisms that determine changes in their physical performance during the menstrual cycle.

The peculiarity of building the training process for women specialising in middle-distance running was the topic of research by O. Roda *et al.* (2018). The authors substantiated and developed the structure and content of the basic mesocycles of the training process for middle-distance runners, taking into account functional changes in the female body. The dissertation research of N. Yevpak (2018)

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was devoted to the issue of optimisation of the process of competitive activity of female water polo players. Research was conducted to increase the effectiveness of the training process of female athletes who specialise in martial arts. L. Shakhlina *et al.* (2021) considered the issue of load planning in the micro- and mesocycles of training female athletes who specialise in judo in different phases of the menstrual cycle. O. Lysenko *et al.* (2021) studied the issue of the manifestation of special working capacity of high-class female boxers depending on the cyclical functioning of the body. I. Diadechko (2018) researched the improvement of the training process of qualified handball players, taking into account the specific features of the body.

However, it should be noted that there is a distinct lack of scientific developments devoted to optimising the sports training of young female athletes. An exception is the study by E. Vrublevskiy *et al.* (2018), which is dedicated to optimising the process of special physical training of girls specialising in short-distance running, taking into account the biorhythms of their bodies. It is also necessary to note the studies by K. Bugaevsky (2021; 2023), who studied the peculiarities of the process of sexual maturation of young female athletes involved in sports games. From the point of view of ensuring an increase in the efficiency of the training process of young female track and field athletes, it is of great interest to study the dynamics of not only such an integral indicator as the sports result but also important indicators of motor capabilities during the entire OMC and not only in its separate phases. Therefore, the purpose of the study was to study the dynamics of various indicators of motor capabilities of young all-around athletes during the OMC.

Materials and Methods

To realise the set goal, the following research methods were used: analysis, systematisation and generalisation of data from the literary sources of the researched issues; pedagogical (observation, experiment) testing; sociological (questionnaire); methods of mathematical statistics. Before the start of the study, a questionnaire was conducted among 31 sportswomen using an anonymous questionnaire in order to identify individuals with a normal course and the same duration of OMC. After analysing the data from the questionnaires, subjects were selected from the OMC lasting 28 days. As a result, 23 female track and field athletes aged 17-18 ($N = 23$) took part in the study, 20 of whom specialised in track and field all-around. Among the researched were eight sportswomen who had the sports Category I and 15 – the sports Category II.

The level of motor capabilities of young female track and field athletes was determined on the 1st, 4th, 7th, 11th, 13th, 14th, 17th, 22nd, 24th and 28th days of the OMC. The selection of these days for testing was carried out in accordance with the generally accepted classification of OMC (Anderson & Babcock, 2008; McNulty *et al.*, 2020; Carmichael *et al.*, 2021). The dynamics of indicators of the motor capabilities of multi-athletes girls were determined during the three OMCs of the preparatory period of the annual training cycle. In the process of ascertaining the experiment, the following pedagogical tests were used to determine the motor capabilities of young track and field athletes: the physical working capacity (PWC 70) test using running loads; running 30 and 60 m (speed abilities); running 150 and 300 m (speed endurance); performing long jump from a standing position (speed-strength abilities); hand dynamometry (hand muscle strength) (Krutsevich *et al.*, 2011).

The methods of mathematical statistics of actual material were carried out in order to interpret the results of the pedagogical experiment. The following were determined: the arithmetic mean of the variation series ($\bar{x}$), the mean square deviation (S), the error of the arithmetic mean (m). Comparison and reliability of differences between separate groups of indicators were determined using the Student's t test at a significance level of at least 0.05. Statistical processing of the research results was carried out on a personal computer using the package of applied statistics of automated data processing systems STATISTICA 6.0, as well as the spreadsheet editor Excel for MAC-2015.

The girls studied are members of the sports club of Khmelnytskyi National University. The research was conducted in compliance with the requirements of the Declaration of Helsinki (2013). The questionnaire included the following questions: 1. Age; 2. Type of sport; 3. Rank; 4. At what age did you start playing sports?; 5. At what age did you start menstruating?; 6. Nature of the menstrual cycle (regular, after 21, 24, 28, 30, 40, 60 days (underline), irregular (indicate the duration of breaks, was there bleeding?)); 7. Nature of bleeding before starting to play sports; 8. Nature of bleeding after starting to play sports; 9. Feelings before menstruation (headaches; swelling of the mammary glands; increased fatigue, irritability; pain in the small pelvis); 10. Feelings during menstruation; 11. Do you train on all menstrual days (yes, no, with restrictions, without restrictions)?; 12. Is training during menstruation effective?; 13. Do you participate in competitions during menstruation?; 14. What were your results in competitions in which you participated during menstruation?

Results and Discussion

As a result of the study of the general physical performance of track and field athletes according to the PWC 70 test, it was established that it is not constant during the OMC but fluctuates according to the phases of the menstrual cycle. The lowest level of work capacity is observed in the subjects in the premenstrual and menstrual phases. The highest level of work capacity in the cycle was registered in the postmenstrual and postovulatory phases, with some decrease in the ovulatory phase (Table 1).

Table 1. Changes in indicators of general physical performance of female track and field athletes during the OMC, $N = 23$

OMC days	Statistical indicators, m/s			
	$\bar{x}$	S	m	p
1	3.37	0.26	0.05	
4	3.41	0.26	0.05	< 0.05

Table 1, Continued

OMC days	Statistical indicators, m/s			
	$\bar{x}$	*S*	*m*	*p*
7	3.71	0.33	0.07	< 0.05
11	3.91	0.38	0.08	< 0.05
13	3.88	0.36	0.08	> 0.05
14	3.65	0.35	0.07	> 0.01
17	3.95	0.38	0.08	> 0.05
22	3.86	0.40	0.08	> 0.05
24	3.80	0.39	0.08	< 0.05
28	3.39	0.36	0.08	> 0.01

Note: $\bar{x}$ – the arithmetic mean of the variation series; *S* – mean square deviation; *m* – error of the arithmetic mean; *p* – reliability of Student's *t* test differences
Source: created by the author

Physical work capacity changed not only in different phases of the OMC but also during the phases themselves. The data in Table 1 show that the smallest value characterising work capacity was observed on the 1st day of the cycle – 3.37 ± 0.25 m/s. On the 4th day, that is, before the end of the menstrual phase, the work capacity increased – 3.41 ± 0.26 m/s. On the following – 7th and 11th days, the indicator increased to 3.71 ± 0.33 m/s and 3.91 ± 0.38 m/s, respectively. Some deterioration of work capacity was observed during the ovulatory phase (13-14 days) – 3.88 ± 0.36 m/s and 3.65 ± 0.35 m/s, respectively. On the 17th day (postovulatory phase), there was a repeated increase in the physical performance of the subjects to 3.95 ± 0.38 m/s, the level of which did not change significantly until the 24th day of the cycle. On the 28th day, i.e., in the premenstrual phase, the studied indicator rapidly decreased to 3.39 ± 0.36 m/s. Thus, in the studied girls, the two phases of OMC – postmenstrual and postovulatory – are characterised by the highest level of general physical work capacity.

The dynamometry method was used to assess the level of strength development of the subjects. The level of development of speed and strength abilities was determined by the results of the "Long jump from a standing position" test. The results of the study of the manifestation of strength indicate a certain increase in it until the end of the menstrual phase and a significant increase in the postmenstrual phase. In the ovulatory phase, this level decreases slightly, after which it rises a second time. The premenstrual phase is characterised by a decrease in the level of manifestation of strength. The dynamics of strength manifestation by days of the menstrual cycle were as follows (Table 2).

Table 2. Changes in strength indicators and speed-strength abilities of track and field athletes during the OMC, *N* = 23

OMC days	Statistical indicators							
	Hand dynamometry, kg				Long jump from a standing position, cm			
	$\bar{x}$	*S*	*m*	*p*	$\bar{x}$	*S*	*m*	*p*
1	35.58	2.97	0.62	< 0.05	228.6	9.51	1.98	
4	36.56	2.93	0.61	< 0.01	230.8	7.99	1.67	< 0.05
7	38.51	2.71	0.57	< 0.05	240.4	9.54	1.99	< 0.05
11	39.86	2.77	0.58	< 0.05	246.6	8.59	1.79	< 0.05
13	39.08	2.59	0.54	> 0.05	244.6	8.13	1.70	< 0.05
14	38.47	2.27	0.47	< 0.05	242.3	9.71	2.02	< 0.05
17	39.80	2.50	0.52	< 0.01	244.8	8.67	1.81	< 0.05
22	39.24	2.48	0.52	> 0.05	243.7	8.32	1.73	< 0.05
24	38.12	1.87	0.39	< 0.05	239.0	9.69	2.02	< 0.05
28	35.73	2.28	0.48	< 0.05	234.7	9.26	1.93	< 0.05

Source: created by the author

The lowest values were observed on the 1st day of the cycle – 35.58 ± 0.62 kg. By the 4th day, the manifestation of strength increases to 36.56 ± 0.61 kg. Its significant growth took place on the 7th day to 38.51 ± 0.57 kg and continued until the 11th day – 39.86 ± 0.58 kg. During the period of ovulation (13-14 days), the indicators decreased slightly, respectively – 39.08 ± 0.54 kg and 38.47 ± 0.47 kg, but on the 17th and 22nd days of the cycle, an increase was recorded again in the level of strength (39.80 ± 0.52 kg and 39.24 ± 0.52 kg). However, already on the 24th day, the indicator of hand muscle strength decreased to 35.73 ± 0.48 kg. Therefore, the indicators of the strength of young multi-athletes during the OMC changed unevenly: they gradually increased in the menstrual and at the beginning of the postovulatory phase; sharply increased at the beginning of the postmenstrual phase and significantly decreased before menstruation.

The study of the dynamics of the speed and strength capabilities of track and field athletes during the OMC made

it possible to identify common features in the dynamics of the dynamometry indicators and the results in the "Long jump from a standing position" test. The lowest test results are characteristic of the menstrual phase. In the post-menstrual period, they reach their maximum. Some decrease in indicators of speed-strength abilities was observed in the ovulatory phase, which increased again in the postovulatory phase (17th and 22nd days). In the premenstrual period, the results of the jump significantly deteriorated to the level characteristic of the menstrual phase. Analysing the dynamics of the results of the "Long jump from a standing position" test, it should be noted that it improved from the 1st day of menstruation and on the 4th day was 230.8 ± 1.67 cm. Further improvement of the indicator to 240.4 ± 1.99 cm was registered on the 7th and up to 246.6 ± 1.79 cm on the 11th day of the cycle. In the ovulatory phase, the indicators decreased – on the 13th day to 244.6 ± 1.70 cm, on the 14th day to 242.3 ± 2.02 cm. By the 17th day, the results reached high values for the second time in the cycle – 244.8 ± 1.81 cm, which are kept until the 22nd day. By the 24th day, they significantly deteriorated to 239.0 ± 2.02 cm and even more on the 28th day – 234.7 ± 1.93 cm.

To characterise the speed capabilities of track and field athletes, the tests "Running 30 m from a walk" and "Running 60 m from a high start" were used. Since running at this distance refers to short-term maximum power exercises and its energy supply is determined by the amount of creatine phosphate in the muscles, the obtained results were used as indirect indicators of the analactate anaerobic power of sportswomen (Shakhlina, 2020). The results of the study of the dynamics of the "Running 30 m from a walk" test during the OMC indicate their gradual increase, starting from the end of the menstrual phase (4th day) to the 11th day of the cycle: 3.65 ± 0.02 s and 3.38 ± 0.02 s, respectively. Some reduction of the indicator took place in the ovulatory phase (3.41 ± 0.01 s). High results were demonstrated for the second time during the cycle by athletes in the postovulatory phase: 17th day – 3.23 ± 0.01 s; 22nd day – 3.35 ± 0.01 s. By the 24th day, the indicators of 30 m run decreased (3.44 ± 0.02 s), and in the premenstrual phase (28th day) – significantly worsened (3.65 ± 0.02 s) (Table 3).

Table 3. Changes in indicators of speed abilities of female track and field athletes during the OMC, $N = 23$

OMC days	Statistical indicators							
	Running 30 m from a walk				Running 60 m from a high start			
	$\bar{x}$	S	m	p	$\bar{x}$	S	m	p
1	3.73	0.10	0.02		8.39	0.08	0.02	
4	3.65	0.08	0.02	< 0.05	8.36	0.09	0.02	> 0.05
7	3.54	0.07	0.01	< 0.05	8.26	0.10	0.08	< 0.05
11	3.38	0.08	0.02	< 0.01	8.03	0.12	0.02	< 0.01
13	3.40	0.07	0.02	> 0.05	8.04	0.14	0.03	> 0.05
14	3.41	0.07	0.01	> 0.05	8.10	0.13	0.03	> 0.05
17	3.23	0.06	0.01	< 0.01	8.03	0.12	0.03	> 0.05
22	3.35	0.07	0.01	< 0.05	8.04	0.12	0.03	< 0.05
24	3.44	0.07	0.02	< 0.05	8.12	0.11	0.08	< 0.05
28	3.65	0.08	0.02	< 0.05	8.35	0.08	0.02	< 0.05

Source: created by the author

Indicators changed almost in the same way during the OMC in the "Running 60 m from a high start" test. Thus, the lowest results were observed in the menstrual phase (8.39 ± 0.02 s). During the postmenstrual phase, they gradually increased: 4th day – 8.36 ± 0.02 s; 7th day – 8.26 ± 0.08 s; 11th day – 8.03 ± 0.02 s. Some decrease in indicators occurred in the ovulatory phase (8.10 ± 0.03 s). A secondary improvement of the results in the 60 m run was observed in the postovulatory phase (8.03 ± 0.12 s), which was replaced by a significant deterioration in the premenstrual period of the cycle (8.35 ± 0.02 s). It was not established the complete identity between the changes in the results in the 30 and 60 m run during the OMC, which could be expected. This fact can be explained by the fact that during the 30 m run, the decisive factor is the manifestation of absolute speed abilities, and during the 60 m run, the level of development of speed endurance exerts an influence. If a single run of 60 m does not yet require its manifestation, then a different situation arises under the condition of 3 repetitions, which was the case in the study.

The level of manifestation of high-speed endurance depends, first of all, on the efficiency of glycolytic processes. To improve this mechanism of energy generation, high-intensity physical activity lasting 20-60 s is used (Zemtsova, 2019). In this regard, it is necessary to analyse the data received from the study of the dynamics of results in running 150 and 300 m. The dynamics of the results of the 150 m run during the OMC (Table 4) is almost identical to the change in the indicators in the 60 m run. From the 1st and 4th days of the cycle, the results almost do not change and improve to 21.20 ± 0.10 s only by the 7th day.

Table 4. Changes in indicators of speed endurance of female track and field athletes during the OMC, $N = 23$

OMC days	Statistical values							
	150 m run				300 m run			
	$\bar{x}$	S	m	p	$\bar{x}$	S	m	p
1	21.58	0.47	0.10		47.10	0.80	0.17	

Table 4, Continued

OMC days	Statistical values							
	150 m run				300 m run			
	$\bar{x}$	*S*	*m*	*p*	$\bar{x}$	*S*	*m*	*p*
4	21.46	0.49	0.10	> 0.05	46.96	0.97	0.20	< 0.05
7	21.20	0.50	0.10	< 0.05	46.01	0.84	0.17	< 0.01
11	20.62	0.55	0.12	< 0.01	45.44	0.75	0.16	< 0.01
13	20.81	0.50	0.10	> 0.05	45.75	0.79	0.16	< 0.05
14	20.92	0.47	0.10	< 0.05	45.97	0.76	0.16	< 0.05
17	20.74	0.50	0.11	< 0.01	45.38	0.79	0.16	< 0.05
22	20.61	0.55	0.12	< 0.05	45.82	0.71	0.15	< 0.05
24	20.80	0.64	0.13	< 0.05	45.98	0.74	0.15	> 0.05
28	21.27	0.45	0.09	< 0.05	47.23	0.80	0.17	< 0.01

Source: created by the author

Their significant increase to 20.62 ± 0.12 s was observed on the 11th day. Then, on the 13th day, the distance running time deteriorated to 20.81 ± 0.10 s. Repeated improvement of the indicator to 20.74 ± 0.12 s occurred on the 17th day, and its stabilisation – on the 22nd day of OMC. On the 28th day of the cycle, there was a significant deterioration of the results in the 150 m run. The dynamics of the results in the "300 m run" test show that the worst of them were observed in the menstrual and pre-menstrual phases: 1st day of OMC – 47.10 ± 0.17 s; 28th day – 47.23 ± 0.17 s. The best indicators were recorded in the postovulatory period – 45.38 ± 0.16 s. But, already on the 22nd day of the cycle, there was a tendency to decrease the result of running 300 m – 45.82 ± 0.15 s. The data of the conducted research indicate the presence of phase changes of general physical work capacity and other indicators of motor capabilities during OMC. It was also established that the dynamics of each of these indicators have their own characteristics, which are characteristic of one or another phase of the cycle. These features are associated with changes in the functional state of organs and systems, on which the level of manifestation of physical qualities of female athletes depends.

Data from special literature indicate that the dynamics of physical work capacity (the basis of which is the aerobic capacity of the body) depends on the dynamics of the number of erythrocytes caused by changes in the hormonal state (McNulty *et al.*, 2020; Kissov *et al.*, 2022). G. Cristina-Souza *et al.* (2019) indicated that during menstruation, the number of erythrocytes decreases by 1 million on average, and on the 10th day of the cycle, this indicator returns to normal. The same authors note that along with changes in the number of erythrocytes, the dynamics of the haemoglobin content in the blood are observed. Thus, the data obtained on the increase in the level of the general physical work ability of sportswomen in the postmenstrual and postovulatory phases confirm the results of the research of other authors, such as S. Emmonds *et al.* (2019), G. Artemyeva *et al.* (2020) and O. Lysenko *et al.* (2021).

Other factors determined the dynamics of strength, speed and speed-strength indicators that were discovered, which, unlike physical work capacity, begin to increase after the 1st day, and especially by the 7th day of OMC. Then, before the onset of menstruation, these indicators of physical fitness deteriorate. A relatively high level of the investigated indicators of strength, speed and speed-strength abilities in the postmenstrual and postovulatory phases is ensured by an increase in the content of corticosteroids in the blood due to an increase in the oestrogen saturation of the female body. In addition, the high level of manifestation of these indicators of physical fitness in the specified phases of the OMC is ensured due to the increase in the concentration of androgens (male sex hormones), which increase the synthesis of proteins in the muscles, as noted by O. Heyward *et al.* (2020) and L. Shakhlina *et al.* (2021). The results of the research confirm these theoretical propositions, as well as the scientific investigations of E. Vrublevskiy & M. Kozhedub (2018) and O. Shishkina & I. Beygul (2023).

As already noted above, the level of speed endurance of female track and field athletes in different phases of the OMC was determined using the "150 m run" and "300 m run" tests. The duration of this high-intensity muscular activity is 20-50 s, and its energy supply is due to the anaerobic capabilities of the body. According to I. Zemtsova (2019) and G. Klymenko & M. Filippov (2023), one of the most important components of anaerobic energy production is reserves of energy substances and the ability to compensate for shifts in the internal environment of the body – the buffer capacity of blood and tissues. Glycogen and glucose serve as energy sources in the process of anaerobic energy generation, and haemoglobin is the most powerful buffer system. The author believes it is possible to use the above facts to discuss the dynamics of speed endurance established in female track and field athletes during the OMC. A low level of high-speed endurance at the beginning of menstruation can be explained by a decrease in the content of glycogen and haemoglobin.

The gradual increase in the number of erythrocytes, the content of glycogen and haemoglobin caused a corresponding increase in the level of high-speed endurance in the postmenstrual phase of OMC. It should be added that the data obtained regarding the study of changes in speed endurance indicators coincide with the results of D. Tsys *et al.* (2023). Therefore, during the OMC, the level of manifestation of the motor capabilities of sportswomen changes in accordance with the phases of the cycle, each of which is characterised by one or another state of the menstrual function and the body as a whole. Taking this provision into account in the process of building a training process will increase its effectiveness in terms of ensuring positive dynamics of the motor capabilities of female multi-sport athletes without increasing the volume and intensity of physical activity.

Conclusions

The level of manifestation of various motor capabilities in sportswomen during the OMC is not constant and changes in accordance with the phases of the cycle. The lowest level of manifestation of physical work capacity, strength, speed, speed-strength abilities and speed endurance in the cycle is observed in the menstrual phase. Thus, the lowest value characterising work capacity was observed on the 1st day of the cycle – 3.37 ± 0.5 m/s. The manifestation of strength according to dynamometry indicators was also the lowest on the 1st day of the OMC – 35.58 ± 0.62 kg. The same common features were found in the indicator of speed-strength abilities, which were determined by the results of the "Long jump from a standing position" test (the worst result on the 1st day of menstruation was 228.6 ± 9.5 cm). The dynamics of the results in the 30 and 60 m running indicators also indicate the lowest values at the beginning of the cycle (3.73 ± 0.1 s and 8.39 ± 0.08 s, respectively). Changes in the results of the 150 m run are almost identical to the changes in the 60 m run. The worst results are observed in the first four days of the OMC (21.58 ± 0.47 s – 21.46 ± 0.49 s).

The highest level of manifestation of motor capabilities in the cycle is characteristic of the postmenstrual and postovulatory phase, towards the end of which there is a decrease in speed endurance. Physical performance indicators reached their highest values on the 11th day of the cycle (3.91 ± 0.38 m/s), then decreased slightly during the ovulation phase (13-14 days) and increased again in the postovulatory phase of the OMC (3.95 ± 0.38 m/s). A significant increase in strength was recorded in the first week of the OMC (7th day – 38.51 ± 2.71 kg). During the ovulation period, the indicators decreased slightly and then increased again (17th day of the cycle – 39.8 ± 2.5 kg; 22nd day – 39.24 ± 2.48 kg). Speed-strength abilities indicators also increased to the OMC level (246.6 ± 8.59 m/s). In the ovulatory phase, their decrease was observed, and on the 17th day, a repeated increase in the results was recorded (244.8 ± 8.67 m/s). Positive dynamics of speed ability indicators were observed from the 4th to the 11th day of the cycle (30 m run – 3.65 ± 0.02 s and 3.38 ± 0.08 s, respectively; 60 m run – 8.36 ± 0.1 s and 8.03 ± 0.12 s). Some of their decrease occurred in the ovulatory phase with a further increase on the 17th day of the OMC (30 m run – 3.23 ± 0.06 s; 60 m run – 8.03 ± 0.12 s). The manifestation of speed endurance had identical changes: their improvement occurred from the 4th to the 11th day of the postmenstrual phase (150 m run – 21.20 ± 0.50 s; 300 m run – 45.44 ± 0.75 s). In the ovulatory phase, the manifestation of speed endurance worsened, and a further increase in results occurred on the 17th day of the OMC.

A slight decrease in physical performance, strength and speed abilities against the background of a deterioration in the ability to display speed-strength capabilities and special endurance was recorded in the ovulatory phase of the OMC. A decrease in all indicators of motor capabilities in track and field athletes is characteristic of the premenstrual phase. The levels of manifestation of physical work capacity, strength, speed and speed-strength qualities, as well as special endurance during individual phases of the OMC, vary heterochronically. Taking into account the results of the study, in the author's opinion, will allow for optimising the construction of the training process of multi-athletes girls, and such optimisation can be a direction for further research.

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Conflict of Interest

None.

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Динаміка показників рухових можливостей юних легкоатлеток у різні фази овaріально-менструального циклу

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Анотація. Результати узагальнення досвіду підготовки юних легкоатлеток свідчить про те, що врахування біологічних особливостей жіночого організму в спортивній практиці полягає переважно в застосуванні меншого обсягу тренувального навантаження. Водночас не враховуються циклічні зміни рівня проявлення фізичних якостей, які обумовлені фазами овaріально-менструального циклу. Тому метою дослідження було вивчення динамічних показників рухових можливостей юних легкоатлеток-багатоборок протягом овaріально-менструального циклу. Для реалізації встановленої мети були використані такі методи дослідження: аналіз, систематизація та узагальнення даних літературних джерел із досліджуваної проблематики; педагогічні (констатувальний експеримент, тестування); соціологічні (анкетування); методи математичної статистики. У дослідженні взяли участь 23 легкоатлетки віком 17-18 років. Рівень рухових можливостей досліджуваних визначався у дні, які відповідають певній фазі менструального циклу. Визначалася динаміка показників фізичної роботоздатності, швидкісних, силових, швидкісно-силових здібностей, а також - швидкісної витривалості. Було з'ясовано, що рівень прояву зазначених показників у спортсменок протягом овaріально-менструального циклу не є постійним, змінюється у відповідності з фазами циклу і має гетерохронний характер. Найнижчий рівень прояву фізичної роботоздатності, сили, швидкісно-силових здібностей, швидкості і швидкісної витривалості спостерігався у передменструальну та менструальну фазу овaріально-менструального циклу, що обумовлює необхідність зменшення обсягу тренувального навантаження в останньому (четвертому) тижні циклу. Найвищий у циклі рівень проявлення рухових можливостей дівчат-легкоатлеток є характерним для постменструальної та постовуляторної фази, що дозволяє планувати максимальне фізичне навантаження у цей період

Ключові слова: біологічні особливості; жіночий організм; дівчата-багатоборки; фізична роботоздатність; фізичні здібності