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Dynamics of physical preparedness of runners on middle distances who live in various climatic conditions

Abstract. Purpose: to study the dynamics of physical preparedness of runners on 1500 m who live in various climatic conditions.

Material and Methods: 20 qualified runners on middle distances who were divided into two groups took part in the experiment. The first group included 10 runners on 1500 m which are mainly living on the plain, the second – 10 runners on 1500 m which are mainly living in the mountain district. During the research the following methods were used: analysis and synthesis of references, testing, and methods of mathematical statistics. **Results:** indicators are presented and the analysis of the level of physical preparedness of runners on 1500 m is carried out, living in various climatic conditions in the preparatory and competitive periods of a year macrocycle. **Conclusions:** it is established that the level of physical preparedness of runners living in various climatic conditions changes not equally during a year macrocycle.

Keywords: various climatic conditions, runners on middle distances, physical qualities, physical preparedness.

Introduction. The productivity of long-term preparation in run on middle distances depends on the interrelation of all types of preparedness. In modern scientific and methodical literature enough attention is paid to the structure of construction, the content of the training process and changes happening in organisms of the sportsmen specializing in types of endurance in the conditions of midlands and highlands [1–3; 6]. Most fully, in our opinion, the content of the training process in the conditions of mountain preparation at the sportsmen specializing in different types of sport is considered in the works of F. P. Suslov, E. B. Gippenreyter [2], V. N. Platonov [1]. At the same time the researchers pay not enough attention to physical preparedness of sportsmen, as one of the components of sports result. In available to us literature of the last years practically there aren't almost researches devoted to the development of physical qualities of sportsmen in the conditions of highlands and to change of their level in the course of further training.

It should be noted also that fact that a question of influence of training in mountain conditions on preparedness and a functional condition of an organism of the qualified runners on middle distances living in various climatic conditions is remain unexplored.

In available to us literature the researches of the Chinese and Japanese experts were found which are devoted to reactions of an organism of sportsmen to conditions of midlands and highlands, and also intensity of their individual adaptive reactions.

So, the researches of change of HR during trainings in highlands at the fast runners living in different climatic conditions (in highlands and on the plain), testify that the maximum HR decreased irrespective of accommodation conditions after the implementation of the training program in highlands at all examinees on the plain. The researchers note that HR decreases at the sportsmen living on the plain at rest after a long-term stay in mountains. A step change of height at which trainings were carried out (a rise from 2366 m on 3200 m and return on 2366 m), was a stress for an organism and promoted an increase of working capacity at the height of 2366 m at the fast runners living on the plain [4].

Tsyui Chengang and Pu Feng [5] investigated the structure of muscles of the sportsmen specializing in the types of endurance living in various regions of China. Results of the research allowed noting that the efficiency of sportsmen is in direct dependence on "coefficient of muscles" the greatest values of which are recorded at the sportsmen living in Tibet and Gansu.

The incidental researches devoted to a reaction of an organism of the sportsmen who are mainly living in various climatic conditions don't give the chance to create a complete idea of influence of training in mountain conditions on the level of their preparedness and, as a result, on result of the competitive activity.

The objective of the research: to study a dynamics of physical preparedness of runners on 1500 m living in various climatic conditions.

Materials and methods of the research. The researches were conducted in People's Republic of China on the bases of Chenggung (mountain conditions) and Chundzhu (plain). 20 qualified runners on middle distances participated in the experiment which was divided into two groups. The first group included 10 runners on 1500 m which are mainly living on the plain, the second – 10 runners on 1500 m which are mainly living in the mountain district. The sportsmen who were taking part in the experiment, trained according to one program.

During the research the following methods were used: analysis and synthesis of references, testing, and methods of mathematical statistics.

Results of the research and their discussion. The year cycle of training of runners represented the one-cyclic structure of creation of the training process with the long competitive period, lasting 5 months that is connected with a large number of competitions in which examinees had to participate.

3 educational training camps were planned in the conditions of midlands and highlands in a macrocycle of preparation. The first collecting in highlands was carried out lasting 21 days in December. The volume of running loadings made 300 km. Much attention at this stage of preparation was paid to the increase of the level of power and high-speed and power preparedness.

The following stage of mountain preparation was hold in February – March and assumed 28-days stay in mountains, then 7-days – on the plain and 14-days – at the height of 800 m above the sea level. The special attention was paid to the development of power endurance, force and flexibility.

The last stage of preparation was held in mountain conditions in May, just before the beginning of the competitive period, and lasted 14 days. Sportsmen purposefully developed high-speed abilities and high-speed endurance.

The level of physical preparedness of sportsmen was defined three times during a macrocycle. The primary testing was held in September, 2013 before the preparatory period, repeated – in May, 2014 right after the end of collecting in mountains. One more testing – was held in September, 2014, after the end of a competitive season for the definition of influence of competitive loads of the level of physical preparedness of runners on 1500 m.

Results of the testing of runners for 1500 m which are mainly living in plain conditions are presented in tab. 1.

The data presented in table 1 testify that the level of all tested qualities of runners considerably and authentically ($p < 0,001$) increases by the end of the preparatory period.

The comparison of indicators of the second and third tests gave the chance to establish that the level of results in run on 100 m, run by jumps of 100 m (quantity of steps), bending and extension of hands in an emphasis lying, lifting of a trunk in a set for 1 min. and long jumps from a place practically didn't change ($p > 0,05$) during the competitive period.

Indicators authentically decreased ($p < 0,01-0,001$) in special endurance, endurance and high-speed and power endurance tests (run by jumps – performance time) by the end of the competitive period.

Only indicators of force of muscles of an abdominal tension authentically increased throughout the whole training macrocycle.

Table 1

Indicators of the level of physical preparedness of runners on 1500 m which are mainly living in conditions of the plain (n=10)

Tests	Period of holding			t, p	1,2	2,3	1,3
	09.2013	05.2014	09.2014				
	$\bar{X} \pm m$						
Run of 100 m	11,66±0,02	11,53±0,019	11,52±0,015	t	10,91	0,54	8,57
				p	0,001	0,601	0,001
Run of 1200 m	184,67±46,6	180,98±27,0	182,16±29,9	t	5,58	3,39	4,35
				p	0,001	0,01	0,001
Run of 3000 m	506,77±45,67	498,01±16,71	500,24±29,09	t	9,31	2,86	10,16
				p	0,001	0,01	0,001
Run by jumps of 100 m (quantity of steps)	40,9±0,77	39,5±0,72	39,3±2,01	t	6,33	1	5,24
				p	0,001	0,343	0,001
Run by jumps 100 m (time)	22,46±0,37	21,63±0,26	22,11±0,3	t	6,1	4,76	3,24
				p	0,001	0,001	0,01
Bending and extension of hands in an emphasis lying	55,7±0,9	57,1±0,98	56,9±1,88	t	4,12	1	3,09
				p	0,01	0,343	0,01
Lifting of a trunk in a set in 1 min.	49,7±0,9	51,1±1,88	51,4±2,27	t	5,25	1,41	5,07
				p	0,001	0,193	0,001
Long jump from a place	2,77±0,007	2,89±0,008	2,91±0,006	t	5,79	1,96	6,38
				p	0,001	0,081	0,001
Trunk inclination forward from sitting position	18,87±0,39	19,34±0,35	20,0±0,21	t	7,64	5,57	7,99
				p	0,001	0,001	0,001

Indicators of the level of physical preparedness of runners on 1500 m which are mainly living in mountain conditions are presented in tab. 2.

Results of runners on 1500 m considerably and authentically ($p < 0,001$) increased in all carried-out tests by the end of the preparatory period. The exception makes the result in run on 1200 m characterizing the level of special endurance of sportsmen. Indicators of special endurance under the influence of the offered program of training practically didn't change during all macrocycle ($p > 0,05$).

Comparing results in the tests at the end of the preparatory and competitive periods, we come to a conclusion that all of them are rather stable. Only results in a set in 1 min. authentically increase in lifting of a trunk during the whole year of macrocycle of training.

The comparison of dynamics of physical preparedness of the runners on middle distances who live in various climatic conditions revealed the distinctions which are connected, in our opinion, with conditions of an accommodation of sportsmen. So, at the runners living in mountain conditions, the acquired in the preparatory period level of physical preparedness remains until the end of the competitive period practically without changes.

At the runners who are mainly living on the plain, the level of indicators of special endurance, endurance and high-speed and power endurance by the end of the competitive period considerably decreases. In our opinion, it is connected with that inclusion in the program of training of sportsmen of stages of mountain preparation promotes the increase of level of these qualities. The after-effect of a natural hypoxia decreases by the end of the competitive period that leads to the decrease in indicators of the above noted abilities and, finally, results in the competitive exercise.

Comparing changes of high-speed abilities at examinees, it should be noted that, their level is stable throughout the whole competitive period at the runners who are mainly living on the plain; results in run authentically decrease by 100 m ($p < 0,001$) at the athletes who are mainly living in mountain conditions by the end of the competitive period. In our opinion, it is a consequence of adaptive reactions of an organism to environmental conditions.

It should be noted that the runners who are mainly living on the plain had more significant changes of indicators of

Table 2

Indicators of the level of physical preparedness of runners on 1500 m which are mainly living in mountain conditions (n=10)

Tests	Period of holding			t, p	1,2	2,3	1,3
	09.2013	05.2014	09.2014				
	$\bar{X} \pm m$						
Run of 100 m	11,72±0,04	11,54±0,03	11,64±0,02	t p	6,61 0,001	4,67 0,001	3,24 0,01
Run of 1200 m	184,62±44,0	183,26±26,8	183,39±27,3	t p	1,56 0,159	0,31 0,764	1,54 0,159
Run of 3000 m	508,52±29,25	501,98±16,97	502,38±13,99	t p	8,73 0,001	0,50 0,628	6,03 0,001
Run by jumps of 100 m (quantity of steps)	41,1±1,21	39,5±0,94	39,6±0,93	t p	7,24 0,001	0,56 0,591	4,39 0,01
Run by jumps 100 m (time)	22.7±0,41	22,25±0,38	22,33±0,37	t p	4,89 0,001	0,74 0,478	3,66 0,01
Bending and extension of hands in an emphasis lying	55,2±0,4	56,8±0,62	56,5±0,94	t p	7,24 0,001	1,15 0,279	3,55 0,01
Lifting of a trunk in a set in 1 min.	49,5±0,94	50,7±0,9	51,3±2,23	t p	4,13 0,01	1,96 0,081	5,01 0,001
Long jump from a place	2,76±0,006	2,86±0,004	2,87±0,005	t p	7,06 0,001	0,37 0,721	4,57 0,001
Trunk inclination forward from a sitting position	18,47±0,34	19,52±0,35	20,18±0,08	t p	10,25 0,001	4,45 0,01	11,12 0,001

special endurance, endurance and high-speed and power endurance in comparison with the sportsmen who are mainly living in mountain conditions that, in our opinion, is caused by influence of a natural hypoxia.

Thus, the dynamics of the level of physical preparedness in a year macrocycle isn't identical at the sportsmen living in various climatic conditions on condition of use by them identical programs of preparation,.

Conclusions:

1. The analysis of scientific and methodical literature showed that the problem of physical preparedness of the qualified runners on middle distances living in various climatic conditions is practically not studied.

2. The runners on middle distances, mainly living on the plain, have more considerable gain of indicators of special endurance, endurance and high-speed and power endurance in comparison with the sportsmen who are mainly living in mountain conditions.

3. Indicators of special endurance, endurance and high-speed and power endurance of the runners on middle distances who are mainly living on the plain by the end of the competitive period decreased authentically ($p < 0,01 - 0,001$).

4. Results in run on 1200 m characterizing the level of the development of special endurance of the sportsmen who are mainly living in mountain conditions during the whole year macrocycle remained almost invariable.

Prospects of further researches. Further researches are supposed to be devoted to studying of changes of physiological indicators at the runners on middle distances living in various climatic conditions under the influence of trainings in midlands and highlands.

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