

UDC 796.422.16:612.17-057.154-053

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Rational construction of the training process of the strongest women marathon runners to the conditions of midlands and highlands

Abstract. Purpose: in this work we study the rational construction of the training process of the strongest women marathon runners to the conditions of middle and high mountains. **Material and Methods:** the study involved the strongest runners who specialize in the women's marathon running. **Results:** we have analyzed the training sessions in running in middle and high mountains, which can be used from two to five times a year. The principle of training is to acquire a stable long-term adaptation to the conditions close to those of the real competitions. **Conclusion:** it has been proved that training in the mountains has become an integral part of the preparation of highly skilled runners and at the same time high sports results have been achieved.

Keywords: midlands, highlands, women marathon runners, training process, acclimatization, competitions.

Introduction. It is necessary to look for new forms of preparation for the subsequent growth of sports skill which increase the influence on the main compensatory systems of an organism, after all the strongest runners of marathon quickly adapt for the influence of small and average loadings, and such form of preparation finds a weak training effect.

Training in conditions of midlands and highlands is one of the means of an effective training of the strongest runners of marathon.

Specifics of preparation, its mode, volume and intensity, sequence of application of different means and methods, volume of general physical and special preparation in conditions of midlands and highlands are used depending on concrete tasks of the training process.

In particular, the creation of the training process in mountains connects with stages of acclimatization. Undoubtedly, the principle of systematic passing of an initial stage of adaptation (sharp adaptation), the lengthening is the cornerstone of rational planning of trainings during the second stage (transitional adaptation) of the formation of structural and functional changes, and also the support of a complex of adaptation changes at rather stable level, characteristic for the third stage (permanent adaptation).

The work of big intensity is carried out on the first week of stay in conditions of midlands and highlands which worsens the working capacity further. Therefore runners in whom loading within the first week of stay in mountains didn't exceed 85% to the volume of the previous loading on the plain, most successfully act in competitions at once upon the termination of collecting, and sportsmen who executed 90% of a usual work during this period, show results below their opportunities.

Such application of loadings is recommended: on the I stage (5–7 days) – the considerable decrease in intensity and volume (20–25%); on the II a stage (5–7 days) – the achievement of sizes of training loads which answer such on the plain to rise to mountains; on the III a stage (10–15 days) – the volume and intensity are given taking into account preparation for future competitions.

The objective of the research: to show a rational creation of the training process of the strongest runners of marathon in conditions of midlands and highlands.

Material and methods of the research: analysis, processing and synthesis of literary data to the point of a task. The strongest runners who specialize in run on marathon distance took part in the research.

Results of the research and their discussion. Educational and training classes in run can be applied from two to five times for a year in conditions of midlands and highlands. Thus a departure in midlands and highlands can coincide on the duration with the corresponding stage of training (impact, precompetitive), the period (transitional) or to be a component of a longer stage (basic, direct preparation for responsible competitions).

It is proved that the longer stay of sportsmen in conditions of midlands and highlands is –the higher on quality and more resistant working capacity is during performances, after all the principle of preparation is reduced to the acquisition of permanent long-term adaptation to the conditions close to in what sportsmen will act. The process of adaptation is completely positive and meets the requirements of the solution of these tasks. The longer stay of sportsmen in midlands or the more often they train in conditions of midlands – the highest and more resistant results are which are shown at performances in similar conditions.

The stay in mountains is used as the form of an additional stress at preparation for the performance on the flat district on an optimum size of which depend physiologic shifts which promote the growth of sports skill through a certain time after a descent to the flat district [11; 13].

Hypoxic influence of midlands and highlands is an additional incentive of the increase of compensatory functions that increases functionality of an organism in an adjusted total. In this case the adaptation is a negative factor which limits positive opportunities of the increase of functional indicators of a sportsman at a reusable visit of midlands and highlands which break the forward growth of sports results in marathon runner. Therefore preparation in mountains has to have faltering character, alternate with long intervals (12–24 weeks) of training in the conditions of the flat district. A break between visits are shortened and, the main thing is stored the high level of variability of the training process in the process of adaptation to conditions of midlands and highlands.

Deterioration of health, emergence of apathy, excess excitability, irritability, a bad dream, decrease in the general and special working capacity, deterioration of results in trainings and decrease in desire to train are noted at marathon runners especially that for the first time arrived to conditions of midlands and highlands at the beginning of stay.

The adaptation of the adapted sportswomen (who visited conditions of midlands and highlands 5-6 times) passes more

effectively (due to the increase of depth of breath and slight increase of HR at rest). At not adapted who arrived in midlands and highlands for the first time, these changes were expressed and were supplemented with other adverse changes of indicators of separate functions of the cardiovascular system, increase of frequency of breath, dispersion of attention, emergence of skin reactions of an atypical, but others. Regulatory systems of an organism conduct the strengthened and the irrational search of an optimum level of regulation and functioning.

Female marathoners had a gain of sporting achievements, indicators of working capacity, level of aerobic productivity, reduction of an oxygen debt and level of lactate in blood after the standard work at separate stages of preparation, electrocardiogram indicators were stabilized after the maximum loading both on volume, and by intensity, there was an increase of oxygen capacity of blood, there was more rational regional regulation at blood redistribution. All this characterizes the increase of power and efficiency of functioning of the main and compensatory systems of an organism and their separate functions that leads to the increase of endurance to hypoxia both atmospheric and motive and in an adjusted total to the increase of special efficiency of female marathoners.

The most effective remedies of the increase of productivity of preparation in an initial phase are the use of midlands at small heights (600–1000 m above the sea level) [4].

It is revealed, what even at these heights, completely habitual exercises are superfluous for the flat district. Especially dangerous high-speed and power exercises of big power and volume, intensive running loadings are.

Average heights (100–2000 m) are the most effective for the increase of skill of sportsmen.

Specialized preparation in these conditions happens to an additional emotional stress, but it isn't followed by the inefficient pathological changes at a rational combination with means of renewal, and is strong incentive of the subsequent increase of special preparation.

At such heights training of female marathoners promotes the growth of all motive qualities and is most expressed – to endurance growth, forms strong will, raises possibility of work of sportsmen in the conditions of hypoxia, the general and special resistance of an organism of sportsmen to a stress in general and to a lack of oxygen in particular.

The average heights are insufficient in order that to cause a mountain illness in a healthy person. However a number of its signs which is reflected in a psychological state of a sportsman and the increase in low results during estimations in the first days of acclimatization are noted in the conditions of intense training.

In the first days of stay in conditions of midlands the organism of the sportsman which carries out big loading, reacts to a complex of irritants increase of pulmonary ventilation, increase in HR and reduction of MOC. It considerably reduces results in kinds of sports connected with the endurance manifestation.

The time of renewal of operability of an organism, and also normalization of its functions fluctuates from 3 to 25 days upon the termination of collecting in mountains.

The phase of adaptation processes during acclimatization to the conditions of midlands laid in the basis of a technique of the creation of training which is that the sparing training mode – the decrease in volume and intensity of work and their increase in the next days has to be carried out in a “sharp” phase.

Runners of marathon who had qualification from the I category to the masters of sports of the international class took part in the research.

At all sportsmen the data of electrocardiogram were registered (by the standard technique in 12 assignments) and were analyzed in a condition of the main exchange during the different periods of acclimatization (the 2, 8, 12 days), and also right after run of a limit duration. A special microclimate was in midlands: dry (humidity of 34-70%) and warm, height – 1684 m above the sea level.

Dryness in a mouth was felt at sportswomen, a lot of (60%) had sleeplessness, were irritable in the first days in conditions of midlands and highlands [5; 6].

In particular, the period of adaptation is characterized by hormonal and mediator dissociation. At first the tone of the sympatho-adrenal system raises at the expense of tissue resources that is followed by the increase of excretion of noradrenaline. At the exhaustion of tissue catecholamines there is an activation of brain substance of an adrenal gland which causes the emergence of a phase of “emergency” regulation. This phenomenon is found at the adaptation to hyperbarium, the increased air temperature in the conditions of chamber tests. Obviously, it is the general-biological adaptable mechanism.

The duration of adaptation phase increases for 2–10 days in the emergency stage of application of a training load which demands anaerobic power sources.

In the second and the following visits of midlands sports results are higher on the 10-11th day, than in the first are.

Also there is an endurance level gain connected with the increase of aerobic and anaerobic productivity, profitability of work in zones of moderate, big and sub-maximum capacities, and firmness to hypoxia. It is established by many authors that some bodies and systems in turn are in a condition of hypoxia at rest.

Functions of breath adapt to the hypoxic changes earlier, than others. The training loads directed on the endurance education, promote the increase of profitability of pulmonary ventilation, improvement and economization of function of blood circulation, exchange processes which serve one of the adaptation reasons to hypoxia.

The efficiency of pulmonary ventilation increases with the increase in a sports experience of runners of marathon, especially at moderate degrees of arterial hypoxemia which is coordinated with the data obtained by us in the conditions of laboratory tests.

The initial stage of adaptation to conditions of midlands and highlands by the increase of pulmonary ventilation is characterized, mainly due to deepening of breath and a little less at the expense of breath frequency.

Breathe delay duration at sportsmen who train in marathon race at height, both a breath, and an exhalation, and also VCL in the first days of stay at height decrease [8–10].

The increase of HR on 10-12 bpm are noted for the first time arrived at sportsmen at rest in the first days have stay in

midlands and highlands and on 5–6 – for those who often train in conditions of midlands (more than 10 visits).

At the same time, when performing running work of 10x1000 m through 5–6 min of slow run on the plain a sportsman is capable to run each kilometer for 3 min 00 s – 3 min 10 s. The first such training in conditions of midlands and highlands for the 10th day of stay can be executed in the mode of 1 km for 3 min 10 s – 3 min 20 s. In this period the decrease in the general physical efficiency of sportsmen is noted.

The adaptation to conditions of midlands and highlands has considerable individual differences at female marathoners. At the same sportsmen changes of warm activity, breath function has essential differences at the repeated visit of midlands and highlands when performing identical loading [7].

Respectively, there is an inconsistency at activity of function of blood circulation and breath, and also violation of regulatory ability of the nervous system under the influence of conditions which exist in midlands and highlands. The processes considerably grow at the increase in the general physical activity inconsistency.

In such conditions the intensive training is adverse because it increases deficiency of oxygen.

Moderate response and adaptation of systems to the deficiency of oxygen in the atmosphere create rational conditions for the nervous regulation of functions in an organism and lead to oppression of autonomous regulation of systems which increases the efficiency of their functioning and is favorably reflected in the level of the general and special working capacity.

Especially oxygen starvation amplifies during the vigorous muscular work through the insufficient strengthening of function of breath. If at rest and at moderate physical activity, the applied mechanisms of breath can provide the consumption of the necessary amount of oxygen at sports loadings which are followed by the consumption of large volume of oxygen, excessive demands are made to respiratory system sometimes [12].

V. D. Monogarov [8] considers that the adaptation mechanism in many respects depends on physical fitness of sportsmen, and also on its individual resistance to hypoxia.

Therefore, the essential differences are installed in mechanisms of the emergence of a lack of oxygen and the change of systems of providing thus on the basis of the experimental data about the influence of hypoxia on activity of the main adaptable mechanisms of runners of marathon and studying of influence of a motive hypoxia which occur in results from sports activity with the use of training loads of high intensity [7].

Hypoxia can arise as a result: a) the limited intake of oxygen in an organism (hypoxia which arises at breath by the gas mixes which are grown poor by oxygen; at the reduction of a stream of oxygen in lungs, etc.) ; b) the artificial respiratory standstill (on a breath or on an exhalation); c) the insufficient ability of erythrocytes to connect oxygen; d) the lowered possibility of tissue to utilize the oxygen delivered to them; e) the insufficient or inefficient work of transport systems (first of all, cardiovascular).

At the same time two or several factors that occur most often can influence.

The complex of ecologically unusual, specific factors acts in a combination with physical activity works in conditions of midlands and highlands that are the complex influence of different stresses and their cumulative influence on an organism of a marathoner.

The maintenance of a cycle of foothill preparation in the first both the following visits of midlands and highlands and has essential differences at different stages of the training process in the system of annual preparation.

The first drawing training is characterized by the increased microcycle volume, and the second – intensive in conditions of midlands and highlands.

At the second visit there is a high probability of the emergence of different violations as a result of cumulation of hypoxic influences of height and motive hypoxia.

Planning training in conditions of midlands and highlands, it is impossible to rely on one health of a sportsman. Deep comprehensive regular and careful physiologic and medical examinations are necessary for the definition of influence on an organism of a sportsman of real conditions of preparation. In these conditions normal activity of sense organs can be broken (sight, hearing, sense of smell, muscular feeling, etc.) and be distorted information. The more often a marathoner is in midlands and highlands, the quicker pass adaptation processes.

In particular, preparation for performances in conditions of midlands and highlands requires the frequentation of heights close to on what competitions will be held.

In training of marathoners the important place is given to repeated stay in conditions of midlands and highlands. F. P. Suslov considers that the positive effect of meetings is stored even in the case if a break between them makes 30 days [11]. This break between training meetings allows keeping «traces» of the previous meetings that promotes the achievement of the highest results in run.

Therefore, as a result of the analysis of manifestation of special efficiency of female marathoners by us it is established that it is necessary to reduce loading for a long preparation in conditions of midlands and highlands (20 days and more) in the 1st week. The effect of such training is shown in 12–20 days after descent to the plain and stored within 60–80 days [1–3].

However at sportsmen which loading within the first week of adaptation to conditions of midlands and highlands made 90–96% of intensity, flat without the decrease, and the long effect of the increased working capacity after descent to the plain is shown in 3–4 months. Such set aside effect of a training load is caused much more by the influence of load of an organism of who are engaged:

– in the 1st week adaptation to conditions of midlands and highlands proceeds longer renewal period in the conditions of the flat district. This option of a training load can be used only for sportsmen who not less than 5-10 times were in conditions of midlands and highlands and had thus no negative changes in the most loaded parts of the musculoskeletal device, and also vegetative functions. According to the standard thought, for receiving an urgent effect of the increase of working capacity on the flat district in the first 7–10 days of preparation in conditions of midlands and highlands the volume

of loading shouldn't exceed 70% from flat, and intensity thus has to be 15-25% lower; in the 2nd week of stay in conditions of midlands and highlands are rational to increase run volume to flat level, without increasing intensity of a training load, and in the 3rd – to raise loading at the expense of increase.

Conclusions. Training in midlands and highlands is used many years and its efficiency is well-known. The practical experience of the work of a number of outstanding coaches (B.Y. Novozhilov; A. I. Strelets; Yu. D. Tyurin; V. G. Kulichenko and many others) allows finding such important points after training in midlands and highlands:

1. The increased working capacity is noted upon the return to usual conditions of preparation from the 3rd for 6–7 days. Runners can show good results in competitions especially for the 3rd day.

2. The working capacity slowly decreases at the beginning of the second week.

3. The working capacity increases gradually from 10–13 days, and the competitive activity becomes the most effective for 18–34 day of reacclimatization.

4. One more wave of the increase of the working capacity occurs for 36–50 day, but, as a rule, it happens “mixed”, especially at those sportswomen who actively competed on the first and second waves. These general regularities are in 85–90% of cases. Each sportswoman or sportsman has to learn reactions of an organism on own experience for more effective use of positive training effect of this preparation.

Prospects of the subsequent researches. The subsequent researches will be directed on more purposeful application of the training process because training in mountains became an integral part of the system of training of highly skilled runners and thus they show high sports results.

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Received: 10.05.2015.

Published: 30.06.2015.

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