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RETROSPECTIVE ANALYSIS OF HYPOXIC TRAINING IN ROAD CYCLING IN BULGARIA PERIOD (1945-1965)

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ABSTRACT

The purpose of the theoretical study is to reveal the characteristic features of hypoxic workouts in the period 1945-1965. in road cycling. The study was conducted using the methods: study of information sources, document analysis, theoretical analysis and synthesis. Analysis of the results. In this period characterized by us hypoxic trainings are part of the means of widespread application by the Bulgarian cycling athletes. Then the remarkable results of D. Bobchev, N. Hristov - winner of the 10th Mileage of Peace, D. Kotev, A. Kirilov and many other Bulgarian competitors. Conclusions. It can be predicted that to optimize the training process in road cycling useful will be the wider use of hypoxic workouts

Key words: approach, synthesis, preparation, sources

INTRODUCTION

Sport training is non-standard altitude conditions is considered as a powerful factor that leads to increasing adaptation of athletes and bringing it to qualitative new level, which ensures maximum sport realization in competitions.

Road cycling refers to workload with high to moderate power due to the fact that competitions are held on different terrain, and this is directly related to the power which changes significantly. It increases significantly when “climbing” in the mountain and decreases when descending. This characteristic of road competitions, especially group once, brings cycling to those types of disciplines in which the functional workload has a situational character. However, the consistency of movements in road cyclists, workload duration (both training process and participation in competitions, especially multi-stage) and its continuity allows to refer road cycling to cyclic sports with great to moderate power.

Cyclists need high aerobic capacity (which also increases respectively the anaerobic capacity of the human body), which is best achieved through systematic training process. We must also note the extremely beneficial effect for shaping muscular “topography” of the body and increasing endurance and elasticity of muscles.
The aim of the following theoretical research is to reveal the specific characteristics of hypoxic training in road cycling in the period 1945-1965. Based on the aim of the study we present the following tasks:

1. Analysis of hypoxic training in sports.
2. Analysis of methodical approach and the content of hypoxic training in road cycling in Bulgaria (period 1945-1965).
3. Formulation of conclusions for optimization of the training process in road cycling.

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METHODS

The study was conducted with the help of the following methods: research of information sources, analysis of documents, theoretical analysis, and synthesis.

RESULTS

Training on high altitude again began to develop again after the Second World War and Bulgaria has a significant contribution in this direction in the early 50s of the last century. This progress is related to the names of prof. Kr. Krastev, Il. Iliev, Iv. Staikov, who are considered founders of a Bulgarian school in this direction.

As noted by A. Bichev and Iv. Staikov (1) the studies of K. Krastev, I. Iliev and Iv. Staykov(2) from 1952-1955 on athletes training at different altitudes, show that on higher altitudes there you find more difficulties in the training process (due to the reduction of partial pressure of oxygen in the air). In the process of acclimatization, however, the human body adapts to perform in conditions of oxygen deficiency. This is possible thanks to the complete perfection of oxidation process. When descending on lower altitudes training loads are easier to bear due to the relative increase of partial pressure. This is the main reason for improvement of sport performance when descending from higher altitude to lower ones.

All this imposes special requirements on training methodology in cycling at reduced and increased partial oxygen pressure in the air. Sport performance in cycling is often held in various mountain areas and associated with rapid changes in altitude. In cycling training methodology in altitude change we distinguish three main points: training methodology in the period of acclimatization at reduced atmospheric pressure, training methodology after acclimatization at reduced atmospheric pressure and training methodology for cyclist's acclimatization.

Throughout the period of 50s and especially in the 60s when the upcoming Olympics in Mexico (1968) the problems of altitude training and performance become the most scientific problem in the field of training methodology.

Proof for sport performance on sea level altitude, after living and training on 1700-2000 m for a month, significantly improves endurance, probably due to the increased transport of oxygen transport functions of the blood by increasing the amount of red blood cells.

In the specific period, the hypoxic training is widely used among Bulgarian cyclists. As a result, remarkable performances are achieved by D. Bobchev, N. Hristov (winner in the 10th Peace Cycling competition), D. Kotev, A. Kirilov and many other Bulgarian cyclists.

The idea that traditional altitude training – living and training on high altitude, favors the sport performance at sea level in terms of endurance is increasingly accepted and established.

The authors A. Bichev and I. Staykov (1) noted that before commenting the issue with training methodology in changing altitude, it is necessary to explain the role of air resistance, which plays a significant role in the performance in cycling both on the track and on the road. When moving in the air objects experience resistance. Aerodynamic force, as the drag force is called, most often occurs because of the difference in pressure in from of and behind the object and the vortex formation that accompanies the movement. For example, if it turns out that the pressure acting on the right half of a sphere is greater than the pressure acting on the left half, an aerodynamic force acting on the right to left will be applied to the object. Therefore, the magnitude of the for of the frontal resistance will be crucial to sport performance in cycling, as it acts in the opposite direction to the movement and to overcome it the rider must expend part of his total energy. The force of the frontal resistance must be as minimal as possible.

It is obvious that the cyclist must take a position on the wheel that would provide him with minimum coefficient of drag. The determination of the aerodynamic posture of the cyclist is done as model – it is tested in aerodynamic tunnel. The measured force indicates the magnitude of the frontal resistance. We should not overlook

the fact that the frontal area, which the cyclists expose to air current, influences with its shape to the coefficient of frontal resistance, but with the magnitude of the force of resistance. Therefore, the cyclist must occupy a position on the bicycle that would provide him with the least force of frontal resistance at a given speed. Thus, the aerodynamic stance appears as a compensating factor in air resistance.

In connection with the considered question there is another one related to the air density at an altitude of 2000 m, which is 23-25% lower compared to sea level. Will the sport performance be 23-25% better that at sea level altitude? The studies of Bulgarian specialist Kr. Krastev, Il. Iliev, I. Staikov, A. Bichev and foreign observation show that the speed of most cyclists is improving and many of them show sport performance improvement.

At the same time, the research of the mentioned Bulgarian authors proves that the change in altitude is a new, additional, and very important factor influencing the results of sport training and competing through changes in the body's functions as a result.

This new factor is related to the change in barometric pressure, which puts the functions of the cyclist's body in a favorable or unfavorable situation, depending on whether the cyclist comes from a lower to a higher altitude or vice versa.

All changes, due to the new, more difficult conditions, in which the respiratory and circulatory systems of the human body must work, must be well known in order to conduct proper training process during the acclimatization period. The well-known training methodology must undergo some changes, which aim at the research of, Il. Iliev, I. Staikov, Kr. Krastev (3). The are trying to clarify these changes, as the training in this period poses great danger of fatigue and even impaired coordination of some motor abilities.

It is clear that in order to achieve good results in the training process at reduced partial pressure, during the acclimatization period it is necessary to make such changes in the training methodology that not protect the athlete from overtraining, but also contribute to the use of reduced atmospheric pressure to improve the redox processes.

In the process of acclimatization, it is necessary to reduce the duration of the individual runs (their duration should not be longer than 45-50 sec.), at the expense of increased number of runs. In order to maintain high speed during the run of each part of the training, the recovery time must be increased depending on the individual abilities to recover from training workload.

In the first few days of the acclimatization period, the accumulated fatigue is higher, and the recovery period is longer. Studies clearly show that residual fatigue occurs the next morning after the training session. There are very often cases of increased heart rate and high blood pressure, which indicative and requires longer recovery times during acclimatization period.

The analysis of A. Bichev and I. Staikov regarding the training methodology for cyclists at reduced atmospheric pressure after the acclimatization period show that difference in altitudes is inversely proportional to the time required for acclimatization. For example, when climbing a mountain with different altitudes, there is necessity for acclimatization at 1500 m above sea level for a period of 8-9 days, at 1000 m above sea level – 5-6 days, at 500 m above sea level – 3 days.

After the completion of the acclimatization, the new level of perfection of human body functions allows cyclists to conduct more intensive training process. The changes that have taken place in his body represent a basis that allows a change in the training methodology, and in particular the possibility for longer training sessions with higher intensity.

In this situation, the training methodology is close to that conducted under normal conditions before going to higher altitudes but considering some factors that remain in effect after the period of acclimatization.

1. The new reached level of perfection and synchronicity in the functions of the

organism creates conditions for normal application of the adopted training methodology in cycling.
2. The reduced partial pressure of oxygen in the air acts as an additional factor, making it easier to reach the maximum training load during training sessions.
3. The reduced partial pressure of oxygen in the air continues to affect body's functions even when the cyclists is recovering after training sessions, which makes recovery slower.

The formation of the physical abilities speed and speed endurance during this stage is started by applying the variable and repeated method, in which the high intensity runs are extended both in length and duration, and the rest time is reduced to achieve the desired stress in the body's functions, which has positive impact on training status. For the cyclist to get use to cover competition distance at higher pace, which is systematically repeated in training sessions, control test with longer distance must be included in normal altitude conditions. On higher altitudes, with reduced partial air pressure, the control sessions must be carried out on shorter distance like the ones used in the training process.

The ease with which the sprinting distances in cycling are overcome, which in this case are exception, must be also considered. In them, the control of the training process must be at a distance equal to or slightly longer to the official competition distance.

The effect obtained from this control training session as a shorter distance on higher altitude in the mountain is at least equal to the effect obtained from cycling on a longer distance on a lower altitude.

Endurance training should be conducted by continuously overcoming distances at a medium pace, selecting routes with a higher altitude than the one at which is the cyclist is currently.

The reduced partial pressure is also used for the formation of the physical ability endurance, which significantly influences the formation of this ability, as unequivocally shows the experiments of Dr. Krastev with training animals on a different altitude.

Conducting training session in low barometric pressure creates an excellent opportunity to apply maximal training loads. This shows that the effect of training is influenced by the increased hypoxic condition. The observation of the authors shows that "the volume of necessary adaptive reaction is determined not only by the workload during training sessions, but also by the degree of reduction of oxygen partial pressure in the air…when training in such conditions, fatigue occurs much faster when performing a relatively small training volume." According to K. Krastev (3), considering all the above presented information, when planning the training process, it is easy to reach maximum training loads, as a result of which fatigue occurs faster, and training volume should be reduced. This shows that the training environment allows almost all training sessions to be performed with maximum workload. This must be the aim of training sessions to achieve the best possible training effect.

However, all this is associated, as authors' research(4-8) shows, with great exhaustion, in which, to protect the cyclists from overtraining, a special care must be taken for his nutrition.

The change of barometric pressure requires changes in the training methodology, in accordance with the influence of the increased partial pressure of oxygen in the air. The changes cover two stages:
1. Training of the cyclists at increased partial pressure during the reacclimatization period.
2. Training of the cyclist at increased partial pressure after the reacclimatization period.

We must note that on a cyclist competing on lower altitude than the one the training process was conducted, "there is no complicating factor – reduced oxygen pressure" and the human body is with increased capabilities. This favors the achievement of high sport results.

CONCLUSION

The systematization of the information from our research gives us grounds for the following conclusions:

1. In the specialized literature in the field of sport training and physiology of sport we find analysis, explanations, and specific examples of application of hypoxic training in sport.
2. The analysis of the methodological approach and the content of hypoxic trainings in road cycling in Bulgaria in the period 1945-1965 shows that a Bulgarian school was formed by scientist who experimentally proved the positive effect and introduced this type of impact in the training process.
3. It can be predicted that for optimization of the training process in road cycling it will be useful to apply wider use of hypoxic training as an established traditional approach and updated new specific data from endurance sports.

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