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Physical performance in the annual cycle of the preparatory period of training of football players

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Abstract

Purpose: As we can see, the presence of medical and biological issue in the assessment of FR is its main distinguishing feature in physical activity. Therefore, in the present study the aim was set: to reveal the dynamics of the level of physical performance in the preparatory period of the annual cycle of training of football players. This was due to the fact that in sports each period of the cycle has its own goals and objectives. At the same time, it is advisable to have a high level of physical performance by the time of important matches and tournaments.

Methods: The athletes' HR was determined during two stepwise increasing 5-minute submaximal power loads on a cycle ergometer. The load power was selected in such a way that the heart rate reached the maximum value for each athlete. The latter was calculated according to the formula proposed by I.B. Aulik.

Results: When analysing the construction of training microcycles in the preparatory period, it became clear that from the third week of training the ratio of aerobic and anaerobic loads was 1:3 and then throughout the period changed towards the predominance of anaerobic loads. Apparently, such forcing of special speed and strength training was the reason for a significant decrease in the level of aerobic performance by the end of the first round of competition. The second examination, conducted at the end of the first round of the competition period, showed the following results - many football players had a decrease in the level of FR at the end of the first round of the competition period. Comparing the results of the first survey, which took place in February, and the second one in June, we can note the following. On average, the value of FR decreased in the majority of football players. If in the first examination three football players had IPC at the level of 60.6-65.6 ml/min/kg, and the average index for the team was 54.5 ml/min/kg, in the second case, none of the athletes had these values, and the average index decreased to 49.0 ml/min/kg. Analysing the average values of FR it should be emphasised that in the second survey this indicator worsened by 11%.

Conlcusion: Dynamics of loads in the preparatory period showed that in the training of football players used forced increase in functional training through the use of means of anaerobic orientation. This approach did not justify itself. In the preparatory period it is necessary to use large enough volumes of loads of aerobic orientation, allowing to develop the cardiorespiratory system of the organism of football players.

Keywords: Preparatory period, physical work capacity, maximum oxygen consumption, focus of loads, volume of loads.

Introduction

Physical efficiency (PE) of football players is manifested in the form of two integral properties of the organism, different in physiological nature - aerobic and anaerobic abilities. It is this ability that largely determines the achievement of high results in modern football.

The concept of 'aerobic efficiency' unites a number of functional properties of the organism, conditioning the possibility of performing muscular work due to the activation of oxidative processes, which are associated with the consumption of $_{O2}$ from the atmosphere and contributes to the development of the quality of overall endurance of athletes. In football players this ability is most manifested in those exercises and game episodes, which in the process of their performance allow to fully satisfy the oxygen demands of the organism.

The concept of 'anaerobic performance' combines several important functional properties of the organism that determine the ability of football players to perform muscular work under conditions of insufficient oxygen supply from the outside. It plays a major role in short-term exercises of high intensity, when there is no possibility to provide the working tissues with the appropriate amount of oxygen, resulting in a significant disruption of the internal environment of the body in the process of work. The content of the concept of 'anaerobic performance' largely corresponds to the quality of speed endurance of athletes.

In football, during repeated short-term high-intensity work alternating with short intervals of low-intensity work, respiratory processes acquire an increasing share in the total energy production. The capacity of respiratory processes during work determines the value of the accumulated oxygen debt (it will be the smaller the more $_{O2}$ consumed during work) and the rate of oxygen debt elimination during periods of relative or complete rest [3].

The power of respiratory processes during muscular activity (aerobic performance) is measured by the maximum oxygen consumption per minute (MOC). MPC, according to the

vast majority of researchers, is an indicator of the organism's efficiency. The more oxygen an individual consumes per unit of time, the higher his or her work capacity will be [4,5].

The assessment of FR will be objective only when comparing the result of the work done with its physiological value. Unfortunately, this provision in the practice of training football players is often ignored. Thus, often the time of work and its volume is the only criterion for its evaluation. It should be noted that the criteria for assessing FR developed for track and field athletes cannot be used for football players. The fact is that the specificity of motor activity forms the specificity of vegetative reactions. It is clear that if two players show the same result in one or more different tests, their level of physical fitness is considered to be the same. However, if we consider the reaction of the organism to the given load (for example, by HR), it will appear that one football player has done the work at a lower heart rate and recovery is faster in him than in the second one. In other words, his organism more easily tolerates the given load (lower physiological cost of work), therefore, his functional reserves are higher, and, consequently, the level of FR is higher.

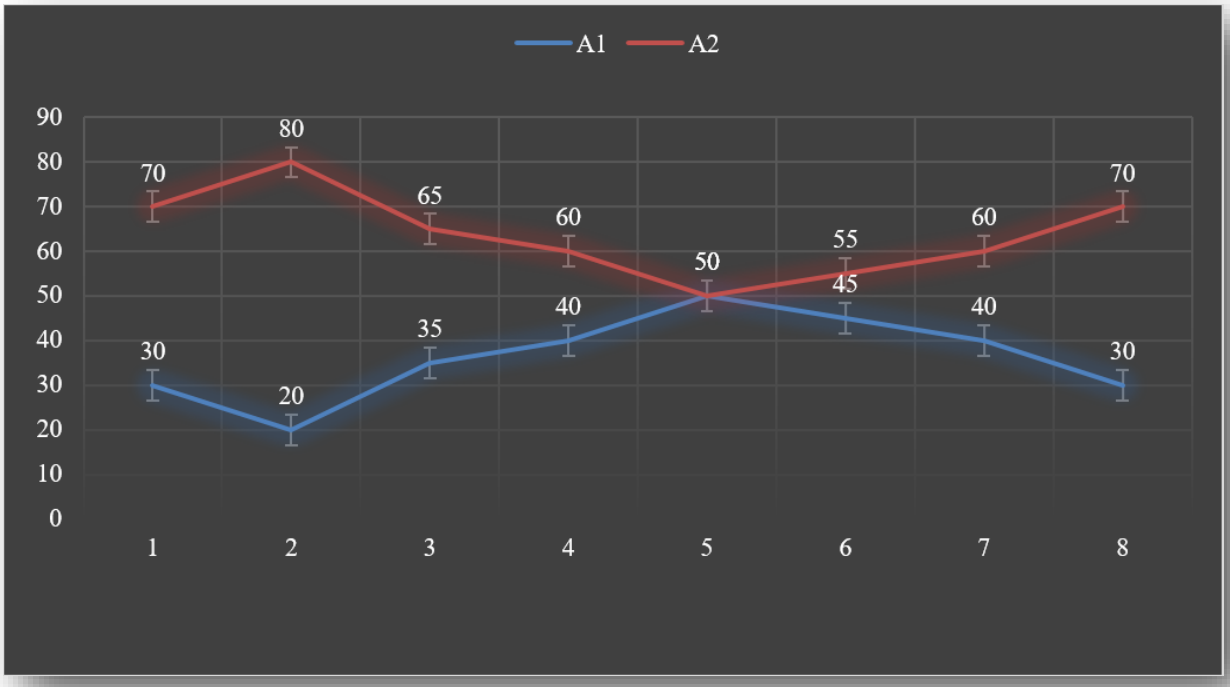
In football, the most important role to ensure the performance of muscular work is played by the system of oxygen consumption and transport, or as it is often called cardiorespiratory system (CRS). Diagnosis of the CPR response to testing loads is the main task in the assessment of football players' FR in laboratory conditions.

Results and discussion

The analysis showed that at the end of the preparatory period football players differed in the level of FR. In this regard, they were conditionally divided into three groups: with high relative IPC (65.6-60.6 ml/min/kg), average (59.1-51.4 ml/min/kg) and low (49.9-48.2 ml/min/kg).

It is known that athletes of cyclic sports have the highest average values of relative IPC: skiers - 82.3 ml/min/kg, track and field athletes - 75.2 ml/min/kg. In football players of the German national team, the IPC averages 73.3 ml/min/kg, in the Swedish national team - 68.0 ml/min/kg [5]. The football players examined by us are significantly inferior in the level of FR. It should also be noted that IPC indices, characterising aerobic abilities of football players, only 18.7% of the examined athletes have a sufficiently high level. In 50% of football players the level of functional abilities can be considered average. 37.5% of football players had low

Table 1. Volume of directionality of loads in % ($_{A1}$ - aerobic and A2 - anaerobic) $_{A2}$ - anaerobic orientation)



indicators at this stage. The above indicates that the majority of football players spent the transition period insufficiently rationally.

Changes in the indicators of aerobic and anaerobic performance in players in the preparatory period depend largely on the nature and volume of the load. The dynamics of the volume of training loads of different orientation in the preparatory period is illustrated in Diagram-

As evidenced by the graph shown in Diagram-1, aerobic loads prevailed in football players at the beginning of the preparatory period. By the third week the volumes of aerobic load decreased and, on the contrary, the private volumes of anaerobic load increased. By the middle of the preparatory period, the share of anaerobic load continued to increase and aerobic load decreased. Further, the greatest share of loads of the preparatory period was accounted for the exercises of speed-force and complex character. The volume of mixed loads reached its maximum by the seventh week (mainly due to the team's participation in the control games). This indicates that in football players there is an inverse relationship between $_{O2}$% and MPC values, reflecting the maximum aerobic power, the higher the MPC values, the lower the aerobic efficiency.

At the same time, a positive correlation was observed between MPC and indices reflecting maximal aerobic-glycolytic capacity. This fact once again emphasises the need to strengthen the work aimed at the development of aerobic efficiency in football players: the increase in MPC creates the necessary base for further development of anaerobic qualities. During the period of the greatest decrease in aerobic capacity, the indicators of game activity, in particular, the indicators of collective and individual technical and tactical actions, were also low. They fell noticeably below not only the model, but also the average values for the team. The results obtained during the observations of football players showed that by the end of the first round of the competitive period the level of FR significantly decreased (by IPC). This fact once again convinces us of the necessity to take into account the specifics of football when interpreting even such a generally accepted criterion of the value of aerobic power of the organism as MPC. These data can be explained by the fact that the increase in the volume of speed and strength orientation at the special preparation and competitive stages naturally increases anaerobic performance, serving as a physiological basis of special endurance of football players and, accordingly, depresses the aerobic performance of energy supply systems. This should not be forgotten when planning training loads of different physiological orientation, both in one training session and in a microcycle.

Excessive enthusiasm for speed and strength work can eventually lead to the accumulation of fatigue, and, as a consequence, to a decline in the efficiency of the team's game activity. Inclusion of aerobic work at the competitive stage allows not only to accelerate the recovery processes from heavy loads, but also to keep the achieved basic level of functional training. Forcing special speed and strength training in the preparatory period caused a decrease in the level of aerobic efficiency by the end of the first round of competitions. It should also be remembered that when developing aerobic and anaerobic capabilities of an athlete's organism it is necessary to avoid negative interactions of urgent training effects of load. Appropriate means and methods of training should be divided in time, i.e. spread over different days of the cycle.

In the second half of the season, some changes were made to the team’s training plan: the volume of aerobic and anaerobic-glycolytic loads increased significantly. Breaks in the competition calendar in July allowed to conduct three training micro-cycles on the type of the preparatory period, where the percentage of means of general physical training was from 25 to 35 in the volume of loads for this month. Making adjustments in the process of preparation of the team allowed by the middle of the second round of the championship to noticeably increase aerobic performance, to achieve a more reliable and effective game. Given the peculiarities of football as a sport, it should be emphasised that aerobic performance is of paramount importance in it. Thus, the pulse rate of football players is 140-200 beats/min, and for 90 minutes of play the participant runs an average of 10 kilometres or more. Therefore, football players need to develop a high level of aerobic capacity (or endurance).

The loads used in the training of our football players lead to the adaptation of the cardiocirculatory system, contributes to the enlargement of the heart, but it is not enough for the required adaptation of the muscular system to the work performed by the players (insignificant values of MPK). On this basis, the cardiorespiratory system should be trained. This will improve the blood supply to the muscular system with a corresponding increase in

MPK, and thus inevitably lead to the timely aerobic fulfilment of the high energy demand. In addition, after intensive exercise during the game, it is possible to recover more quickly during the low-intensity phases.

In addition, endurance training should be targeted. This leads to the need for peripheral adaptation with increased oxygen consumption capacity in the muscles. As a result, the production of lactic acid and the corresponding oxidation in the body does not occur (or occurs only with very intense load) [2].

In order to develop aerobic capacity, it is necessary to select such exercises, the duration of which is 30 minutes or more, the intensity is medium, and the HR is not higher than 150 beats/min. It is believed that for the development of functional qualities of the cardiorespiratory system of football players the most effective will be non-specific exercises, that is, performed without the ball. It should be remembered that training with emphasis on functional training and education of special endurance should be built on the basis of appropriate motor game models, which would take into account not only the number and duration of motor actions of maximum intensity, but also the duration of pauses between them.

The construction of loads in microcycles of the preparatory and competitive periods, aimed at increasing aerobic qualities, is a creative process. Here there can be no ready-made recipes, as everything depends on the level of readiness of a particular football player for this or that stage or period of training, the calendar of competitions and other conditions. Determining the dynamics of physical performance indicators can significantly help the coach in the management of the training process only with careful control and strict accounting of training loads. Knowing the nature of the distribution of loads will allow team coaches to timely adjust the training process.

Conclusion

Aerobic capabilities play a major role in creating the fundamental basis of football players' fitness. Unjustified forcing the development of aerobic qualities through the use of speed and strength training, not supported by sufficient functional reserves on the part of the cardiorespiratory system, can adversely affect the sportsmanship of football players in the competitive period.

It was revealed that at the beginning of the preparatory period only 18,7% of football players had a relatively high level of functional training, 50% of athletes had an average level and 37.5% had a very low level.

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