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The results of the study of the manifestation of functional fitness in competition conditions and the dynamics of physiological loads of matches among the players of the sports improvement group

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Abstract

Purpose: Analysis of the results obtained in relevant scientific studies aimed at studying functional fitness in football sports and determining the dynamics of physiological loads of competitions among players of the sports improvement group.

Methods: The following methods were used in the research process: 1) analysis of special scientific sources on the topic, the results of scientific research; 2) methods of pedagogical analysis of competitive activity of players; 3) methods of mathematical and statistical analysis.

Results: The processes of competitive activity in the sports improvement of players were studied using a heart rate monitoring system, which showed that the time spent by players on movement in five pulse zones was: 130 b/m. Team players in the work area up to 9.9 minutes, 130-150 b/m. 8.6 minutes in the work area, 150-165 b/m. 19.3 minutes in the work area, 165-180 b/m. 27.8 minutes in the work area, 180 b/m. and more in the work area, they performed motor actions for an average of 14.04 minutes.

Conlcusion: There was no stability in the results recorded by players of different roles in controlled matches. If in one match the total volume of movements of a player of a certain role in the pulse zone of the highest intensity was 37% (using the example of right-back N. Ro-in), then in the next match the total volume of movements in this pulse zone was only 6%. This situation was typical for the competitive results of most players.

Keywords: football player, competitive activity, functional indicators, functional training, heart rate, pulse zones.

Introduction

There is no doubt that modern sport places the highest demands on the training of athletes. Among the types of training, one of the most important are special training and functional training of football players. The presence of a high level of functional training allows the player to effectively carry out a wide range of actions in a competitive environment [4]. It is known that among the indicators reflecting functional training, the cardiovascular system is undoubtedly of paramount importance. It is important for the coach to know that the availability of information about the content of research conducted on this subject, knowledge of the results of research and the ability to analyze them is one of the main factors allowing to manage the future training processes of athletes effectively.

Methods

The methods of research work were the analysis of special scientific sources related to the topic, methods of pedagogical observation and analysis, comparative analysis of results, mathematical and statistical methods.

The study of loads during the competitive activity of 16-year-old players of the observed group of sports improvement was conducted during the competitive period of the 2022, 2023 seasons. The football team of the research group was considered to be the Tashkent Pakhtakor U-16 team. During the observation work, the activities of all the players who make up the team were studied and the results were analyzed. The registration of the studied indicators was carried out through the POLAR TEAM SYSTEM 2 heart rate monitoring system. In total, the monitoring work was carried out at more than 20 matches. The observations were carried out during the matches of the Tashkent city championship among boys under 16 years old, in which the team participated, and during the matches of the city championship among boys under 18 years old, in which the team participated. To determine the competition load, participants recorded the sum of heart rates and the amount of energy expended.

At competitions, the determination of the intensity of the load was explained by the time ratios of the actions performed in certain pulse zones, the average heart rate and the indicators for determining energy consumption per minute.

The statistical processing and analysis of the data obtained used generally accepted methods of mathematical statistics. The results were reproduced using several mathematical methods. In particular: x– the arithmetic mean; σ - standard deviation of measurement results; V, % - coefficient of variation.



Fig. The process of using the POLAR TEAM SISTEM 2 heart rate monitoring system for the players of the Pakhtakor U-16 team.

Results and discussion

As a result of a number of scientific studies, it has been established that the successful and effective activity of a football player in competition conditions largely depends on his psychophysiological status. This status determines the individual characteristics of the player and determines high results in overcoming high competitive and training loads [2]. Specialists in physiology, biochemistry and sports medicine, as a result of studying the interrelationships in this regard, show the amount of energy spent by a player during a game as one of the main indicators determining the intensity of loads in football [7]. It has been shown that the rate of metabolic changes is determined by the amount of calories consumed or the amount of oxygen consumed.

Studies have shown that as a result of the absorption of 1 liter of oxygen in the body of players, about 5 kcal. diverges. Energy consumption averages 0.18 kcal/kg min, oxygen consumption is 37 ml/kg min. The high level of metabolic changes and the variety of actions of the players have a versatile effect on the athlete's body, and this condition determines the highest requirements for the body, its preparedness.

The results of the study of changes in the basic physiological functions of highly qualified football players during the game showed that 60-80% of playing time is spent in the mode of maximum oxygen consumption (MOC) 80-100%. Of course, it should be noted that this indicator is specific to highly qualified players. Characteristics of football players with high aerobic ability.

It was found that the average oxygen consumption of highly qualified football players is about 3.3-4.5 liters/min per match. For a 90-minute meeting, the total energy consumption is about 1490-1980 kcal. Therefore, if we describe a football sport in terms of energy consumption, it should be noted that it belongs to sports that require high

Table 1. Indicators of the time spent by players in the game in different pulse modes (2022 according to the results of A. Kirillov's research)

Heart rate	Match duration (%)
Till 130	0-2,0
130-150	6,5-21,0
150-165	16,5-33,0
165-180	31,0-61,0
180-200	10,0-40,0

Table 2. Indicators of performance and energy consumption in competitive matches among football players of different ages (according to the results of a research by D.V. Nikitin in 2008) an

Age	Match duration, minutes	Energy consumption, kcal	Energy consumption, kcal/min.	∑ Heart rate (b/m)	X Heart rate (b/m)
17	90	887 ± 44	9,85	15570 ± 735	173 ± 13
16	80	834 ± 49	10,4	13764 ± 528	171 ± 11
15	70	812 ± 52	10,15	13696 ± 1024	171 ± 13

energy consumption.

The changing nature of a football match requires significant use of the anaerobic energy potential of the athlete's body [5]. It is known that when working in such conditions, the amount of lactic acid in the athlete's body, especially in blood and muscles, increases and this figure is up to 120-150 mg%. During the maximum activity of a football player, the amount of lactic acid increases by 30-50%. At the same time, movement during the match is about 10-12% of the total time. Now, in such a situation, the high and effective performance of athlete is closely related to the function of the player's cardiovascular system. This situation means that the cardiovascular system is activated 10-12 times compared to the working activity of the cardiovascular system in a calm environment.

Table 3. Indicators of performance and energy consumption in competitive matches among football players of different ages (according to the results of a research by D.V. Nikitin in 2008)

Age	Meeting times in heart rate zones (%)				
	Less than 130	130-150	150-160	160-180	More than 180
17	3 ± 6	9 ± 8	16 ± 11	42 ± 15	30 ± 18
16	2 ± 4	13 ± 8	11 ± 7	41 ± 14	33 ± 12
15	3 ± 6	11 ± 8	11 ± 6	40 ± 11	35 ± 11

As already mentioned, the work on the analysis of the functional state of football players has been studied by a number of specialists. Table 1 shows the results of the work performed by A. Kirillov by example.

As can be seen from the table, the indicators of player movements in the working

Table 4. The average time ratios of the movements of the Pakhtakor U-16 team at different intensities in the conditions of competition of players of different roles (Matches within the framework of the Tashkent City Championship 2023 competitions)

Role	Meeting times in heart rate zones (%)					
	Less than 130 b/m	130-150 b/m.	150-165 b/m.	165-180 b/m.	More than 180 b/m	Kcal
flank defenders	13.30 ± 10.12	4.30 ± 1.40	16.40 ± 7.20	24.20 ± 10.30	21.35 ± 5.10	895 ± 59
central defenders	15.05 ± 17.28	6.40 ± 5.30	15.20 ± 10.20	25 ± 10.40	18 ± 11.10	882 ± 49
Flank midfielders	5.20 ± 3.45	9.25 ± 5.40	22 ± 6.10	38.10 ± 12.34	5.50 ± 4.25	860 ± 55
Central midfield-ers	8.30 ± 6.25	12.32 ± 5.30	20.30 ± 10.40	19.39 ± 11.23	20.14 ± 6.30	911 ± 58
attacking midfielders	10.55 ± 9.20	9.30 ± 6.36	24.30 ± 11.05	27.20 ± 12.20	8.15 ± 3.35	835 ± 44
Attacker	7.20 ± 3.42	10.40 ± 6.20	17.50 ± 9.45	33.40 ± 19.12	11.10 ± 6.25	863 ± 53
Average on team $\overline{X}$	9.9 ± 8.3	8.6 ± 4.9	19.3 ± 9.06	27.8 ± 12.6	14.04 ± 6.05	874.6 ± 53

areas of different pulse modes are also different. The fourth work area showed the highest meeting times. Labor activity in this area amounted to 61%. A significant amount of time, up to 40% of the time, was also occupied by high-intensity motor activity.

The results of the research work conducted among young players of different ages were described by the results of various performances at different ages during matches at the competitions, as shown by the results of other research work [6]. In particular, it was known that 16-year-old football players spent 834 ± 49 kcal of energy in one match, and the average value of the heart rate was 171 ± 11 b/m (see table 2).

As already mentioned, our personal research was conducted in order to study indicators reflecting readiness. Turning to the results of the Tashkent "Pakhtakor U-16" team, we can admit that a number of interesting results have been achieved. In particular, significant differences were found between the scores of players playing in different roles in the team during matches. Let's take a closer look at the results and analyze them (see table 4).

From table 4, we can see that the performance of the players of the "Pakhtakor U -16" team in different roles during the matches also showed different results, and we believe that this is a natural result. After all, it is known that the functional duties performed by players during competitions vary depending on their role and largely determine the specifics of their competitive activities.

If you look at the results by role, it can be noted that the flank defenders performed much more intensive work than the central defenders. In addition to the players of this role, the amount of work in the fifth zone was also greater for the central midfielders, in particular, it was found that the central defenders spend an average of 20.14 minutes in this zone.

It is interesting to note that among the role-playing players performing various functional duties, the results recorded by attacking midfielders are thought-provoking, since the total movement time of these role-playing players in the working area of 180 b/m or more was 10% (8,15 minutes) of the total movement time. We think these numbers are a bit understated for players.

The players who performed the fewest movements in the fifth zone were considered flank midfielders. The working activity of the players of this role in this zone averaged 5.50 minutes (6.8%) per match.

The results of the study showed that there are significant differences in indicators (time ratios) of motor activity in different pulse zones recorded by players in competition conditions. For example, the analysis of the results of player F.Olimov, who plays as an attacking midfielder in the team, showed that there are sharp differences in the results recorded by him in the fifth work zone. If in the 2nd round of the championship this player spent 3.7 minutes (4.7%) in the fifth work zone, then in the 3rd round he spent 14.13 minutes (17.5%) in this zone. During the 5th round, 1.06 minutes (1.3%) were spent in this zone. In the 8th round, the driving time in the maximum intensity zone was 8.47 minutes (10.6%). It should be noted that this situation, i.e. finding results within a large range, has been observed in the activities of many players.

Conclusion

According to the analysis of special scientific sources, the importance of physical and functional training of football players is extremely high today. One of the unique features of modern football is that it is believed that the amount of time that makes up an intense gaming activity is increasing more and more. Therefore, in any professional football teams, the issues of improving the functional training of players in this regard will become important in the future, and this aspect needs to be given sufficient attention.

According to the results of personal research and analysis, the results recorded by 16-year-old football players show that they do not pay enough attention to functional and special training. The data collected as a result of personal research showed that the ratios of time spent on work in different pulse modes recorded by the players of the "Pakhtakor U-16" team differed significantly from the results of other studies conducted in this direction. In particular, according to sources, 16-year-old football players spend up to 40% of the match during competitions in the working mode of 180 b/m or more, the results of our study showed that the work activity in this pulse zone averaged 17.5% for the team. However, despite this, there are still those in the observed team who record a high level of training. But the proportion of highly qualified players is smallAs one of the main priorities facing

trainers, it is necessary to implement measures aimed at improving functional and special physical training. We emphasize that during the competition, the importance of developed and planned drugs aimed at the effective organization of body systems in stressed areas will increase.

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