STUDIES OF ANTHROPOMETRIC AND FUNCTIONAL PARAMETERS OF THE REFEREES OF DIFFERENT SKILLS IN FOOTBALL

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Annotation. The problems of functional training of arbitrators of different skills are considered. The study involved 12 referees for the highest, first and second league championship and the championship of Ukraine on football. The level of Simply-weights is studied. It was used the methodology of S.A. Dushanin. Revealed the results of anatomical and physiological condition of the body: heart rate, body temperature and body weight reduction referees during a soccer match. Found that the anthropometric characteristics and the length of body weight statistically significant differences between the arbitrators are not. It is noted that the weight of the arbitrators is markedly reduced during the game. The average weight loss during a major league game the referee is 2.67 kg in the first league of referees' weight decreased by 1.83 kg in the second league referees - is reduced by 1.92 kg. It is established that the level of functional training arbitrators league above the results of their younger colleagues.
Key words: referee, functional fitness, weight, body temperature.

Introduction

Football implies intensive motion actions during certain period of time. In some aspects physical loads of football umpire differ from the loads of football player on football field (umpire does not participate in football duels, does not play with ball, can not be replaced), but, at the same time, physiological peculiarities of their work are to some extent similar. Knowledge about the level of functional state of umpires organisms' systems both in laboratory conditions and during match is necessary and permits to plan training process, depending on the levels' indicators [2].

In recent researches of football refereeing the problems of initial preparation of football umpires have been discussed [8, 10], of their psycho-physiological qualities [11]. A number of scientists in their works pay attention to studying of certain aspects of highly qualified football umpires [9, 12]. Alongside with it, K.L. Vikhrov, A.M. Spirin, V.D. Petrov [4, 6, 7] think that the main criterion of evaluation of umpire's workability is indicators of his motion activity during football match. At the same time, in modern sports science there is no scientific researches, connected with functional abilities of football umpires.

Thus, determination of organism's main indicators for further planning of training process is rather important problem in preparation of football umpires.

The research has been fulfilled on the base of combined plan of scientific & research work in the sphere of physical culture of Ministry of family, youth and sports of Ukraine for 2006-2010, as per subject 2.1.10.3, it. "Optimizing of educational-training process of football players of different qualification" (state registration number 0106U011992).

Purpose, tasks of the work, material and methods

The purpose of the research is to carry out analysis of anthropometric indicators and functional state of different qualification umpires' organisms..

The methods of the research: theoretical analysis and generalization of literature sources, medical and biological methods, methods of mathematical statistics.

As morpho-functional tests we used weight-height indicators; determination of metabolism by methodic of S.A. Dushanin, maximal oxygen consumption (MOC) and threshold of anaerobic exchange (TANE). Results of umpires' organisms' functional state examinations' were obtained with the help of pulse meter, which showed indicators of heart beats frequency (HBF) during football match (see fig. 1).

Fig. 1. Sport watches "Forerunner 405" of «Garmin»production with sensor of pulse frequency

Organization of the research. The researches were conducted with three groups; every group consisted of 12 umpires: 1st group – umpires of the major league, 2nd group – umpires of the 1st league and 3rd group – umpires of 2nd league. All they participated in Ukrainian football championships.

Results of the researches

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Change of football umpire's workability occurs sharply, as a result of a number of disorders in organs and systems' functioning owing to different stresses: overloading, tiredness, wrong planning of training process [1, 3]. Anthropometric and physiological indicators of football umpires' organisms are given in table 1.

Table 1

Anthropometric and physiological indicators of different qualification umpires ($n_1=n_2=n_3=12$)

Indicators		major league	1st league	2nd league
		$\overline{X}_1 \pm m_1$	$\overline{X}_2 \pm m_2$	$\overline{X}_3 \pm m_3$
Length of body, cm		183.1±1.53	182.7±1/08	181.2±1.38
Mass of body, kg		78.1±0.83	78.2±1.06	76.8±1.78
Heart beats frequency in rest (HBF) b.p.m.$^{-1}$		62.9±1.22	63.3±1.22	62.3±1.14
Blood pressure, mm of merc. col.	Systolic	115.3±1.02	118.7±1.24	121.1±1.51
	diastolic	69.5±1.57	68.5±1.73	64.2±1.74
Metabolism as per electro-cardiogram (ECG) conv.un.	Anaerobic metabolic capacity (ANMC)	73.8±0.98	74.4±0.85	67.8±0.74
	Aerobic metabolic capacity (AMC)	217.2±0.98	218.9±1.07	213.8±1.28
Maximal oxygen consumption (MOC) ml.p.m.kg.		52.7±1.43	52.6±1.71	49.9±1.37
Threshold of anaerobic exchange (TANE) 5 from MOC		69.7±1.49	67.1±1.56	64.4±1.22

The obtained anthropometric indicators of body length and mass as well as heart beats frequency (HBF) permit to affirm that umpire of major, first and second leagues have no confident differences ($p<0.05$).

It was found that blood pressure, anaerobic and aerobic metabolic capacity of heart (ANMC and AMC) indicators of umpires, who serve football matches of different leagues are not the same, concerning systolic and diastolic pressure (major league – 115.3/69.5 mm of merc.; first league– 118.7/68.5; second – 121.0/64.2); anaerobic and aerobic capacity of cardiac muscle (major league 73.8; 217.2 conv.un.; first league – 74.4; 218.9; second – 67.8; 213.8);

Maximal aerobic capacity of umpire's respiratory system was determined by the level of maximal oxygen consumption (MOC). Results of MOC of second league umpires are lower by 3.67 ml.p.m.kg., comparing with major league ($p>0.05$) and by 3.58 ml.p.m.kg., comparing with the first league в ($p>0.05$). The level of football umpires' aerobic endurance is characterized by indicators of threshold of anaerobic exchange (TANE). Many specialists note that intensity of training process can be measured in relation to TANE level [5]. Studies of TANE showed that umpires of major and first league have confidently higher indicators, 69.7% and 67.1% correspondingly, than umpires of second league – 64.4 ($p<0.05$). It can be explained by the fact that umpires of higher qualification, in contrast to their younger colleagues, include in training programs exercises for development of aerobic and quickness endurance and, there fore, have better functional level indicators.

The most important criterion of umpire organism's functional state is his physiological indicators during football match. Anatomic- physiological indicators of different qualification umpires during matches are presented in table 2.

HBF is recognized as an integral indicator of umpire's load during match [4]. Mean and maximal HBF values in matches depend on the following factors: the level of umpire's workability, intensity of motion actions in every episode of a match, correlation of durations of active and passive phases of a match, individual peculiarities of cardio-vascular system's functioning.

Table 2

Anatomic- physiological indicators of different qualification umpires during matches ($n_1=n_2=n_3=12$)

Physiological indicators	major league	1st league	2nd league

HBF, b.p.m. $^{-1}$		161.6±0.84	158.6±0.99	154.8±0.85
Body temperature, °C		38.4±0.04	38.3±0.04	38.5±0.04
Mass	Before match	78.1±0.83	78.2±1.06	76.8±1.78
	After match	75.5±0.97	76.4±1.05	74.9±1.71

Basing on HBF indicators of umpires of different qualification during matches we can affirm that in the 1st time HBF of major league umpires varies from 143±1.02 to 171±0.21 b.p.m.; during break it reduces up to 115±0.61 b.p.m.; in the second time umpire works in the range from 146±0,78 to 180±0,49 b.p.m. Umpires of the first league have, in the first time, HBF indicators from 142±1.12 to 175±0.54 b.p.m., in break HBF reduces to 120±0.48 b.p.m., and the second time they serve in the range from 151±0.57 to 171±1.11 b.p.m. Umpires of the second league have the following HBF indicators during match: first time – from 145±0,73 to 171±1,12 b.p.m., at break HBF reduces to 125±0.43, in the second time – from 145±0.56 to 172±0,78 b.p.m., (see fig.2).

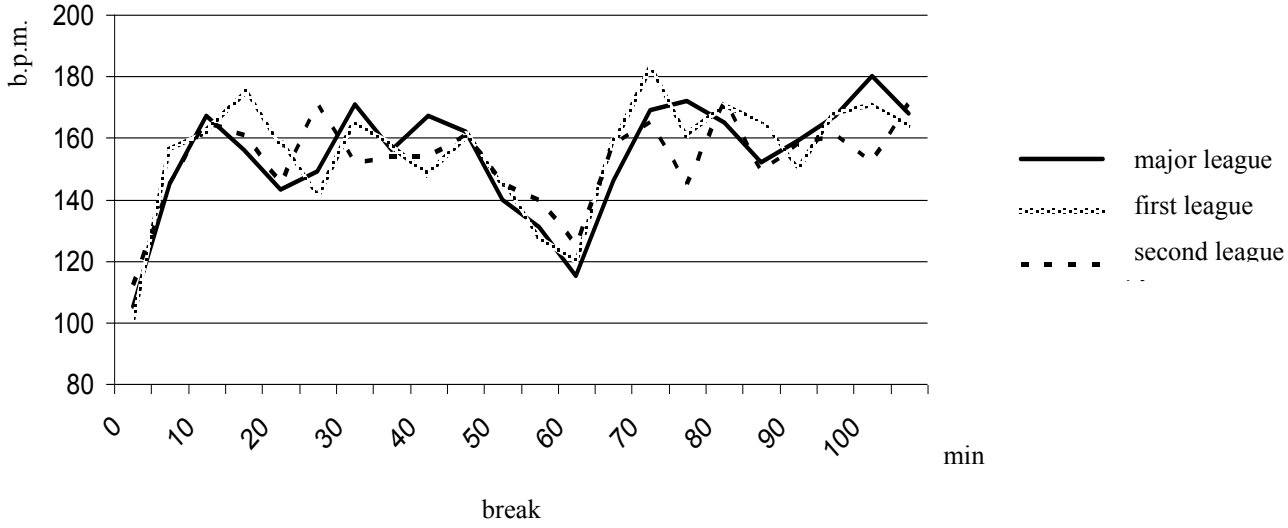

Fig.2. Dynamics of HBF indicators of umpires of different qualification during match

It is known that with physical load human organism changes its temperature. With increasing of temperature higher than 38º the volume of circulating blood and the quantity of lymphocytes increase in sportsmen's bodies, metabolism accelerates, PH changes take place in blood. So, during match body temperature of major league umpires is 38.4±0.04°C and do not confidently differ from umpires of the first league 38.3±0,04°C ($p>0.05$) and the second 38.5±0.04°C ($p>0.05$). Unlike this body temperature indicators of second league umpires are higher than the same of first league umpires ($p<0.05$), that witnesses that cardio-vascular and nervous-muscular systems of less qualified umpires work more intensively.

During match umpires' body mass noticeably reduces in connection with big losses of water and significant energy consumption. During match mean water losses of major league umpire is 2.67 kg ($p<0.05$), of first league umpires body mass reduces by 1.83 kg ($p>0.05$), and umpires of the second league lose 1.92 kg ($p>0.05$) of their mass during football match that is explained by less intensive motion activity during game.

Summary

Basing on the carried out researches, it was found out that anthropometric data of umpires, who serve different leagues' matches, have no confident difference, but at the same time indicators of functional systems are different in the following:

- Systolic and diastolic pressure (major league– 115.3/69,5 mm of merc.col.; first – 118.7/68.5; second– 121.0/64.2);
- Anaerobic and aerobic capacity of cardiac musclea (major league– 73.8; 217.2 conv.un.; first – 74.4; 218.9; second– 67.8; 213.8);
- MOC (major league– 52.7 ml.min.kg.; first – 52.6; second – 49.9);
- TANE (major league– 69.7 % from MOC; first– 67.1; second – 64.4).

The presented here data witness that there is no confident difference between indicators of functional state of major and first leagues umpires' organisms, while concerning umpires of second league they are substantially different ($p<0,05$).

The prospects of further researches. It is stipulated to develop program of training of different qualifications umpires depending on functional state of their organisms.

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