

AN INVESTIGATION OF INDIVIDUAL FUNCTIONALITY FOOTBALL REFEREES OF HIGH QUALIFICATION

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Annotation. *Purpose:* to determine the level of individual functionality arbitrators of high qualification. *Material:* in the experiment participated 29 high qualification arbitrators aged 21-45 years. *Results:* it was found that the means and methods of special physical preparation for a competition to be insufficiently effective. Functionality of arbitrators is different. Only 8 arbitrators have a high level of functionality. *Conclusions:* the study of the functional state of the arbitrators is an important factor in planning their training process. Hard volume and intensity exercise at the wrong planning of the training process can lead to overtraining, reduce special physical readiness, contribute to pathological changes in the body.

Keywords: referees, training, process, planning.

Introduction

Football referees are, as a rule, former football players or coaches. However, not always good sportsman or coach can become good referee. Reasons can be different and one of them is insufficient level of motion skills and functional potentials that hinders fulfillment of professional tasks in tensed and quick competition situations [7].

Thus, the problem of referees' training was regarded by following authors: A.B. Abdulla, A.D. Budogoskiy, K.L. Vikhrov, Yu.F. Kuznetsov, P.M. Kulalayev, A.N. Spirin, Ye.A. Turbin, C. Castagna, K. Page and L. Page. [1-3, 7-9, 11, 13, 18], et al. The works of the mentioned authors were devoted to training of referees of initial qualification or touched on aspects of psychological and theoretical training. Functional training of referees was regarded by the authors only fragmentarily or did not regarded at all. In spite of this all authors noted that it was the most important component in football referee's work. That is why research of functional potentials of highly qualified football referees is urgent as on to day [12, 14-17, 19, 20].

The present research is a part of scientific-research work, fulfilled in compliance with combined plan of SRW in sphere of physical culture and sports for 2011-2015 by topic 2.3 "Scientific-methodic principles of improvement of sportsmen's training in football, considering specificities of competition functioning" (state registration No. 0111U001722).

Purpose, tasks of the work, material and methods

The purpose of the work is to determine individual functional potentials of highly qualified football referees.

For solution of this task we used the following *methods and organization of the research*:

1. Physiological: examination of organism's functional systems with the help of ergo-metering, gas -analysis, pulse-metering. Devices for diagnosis were the following:

- ✓ Treadmill «Laufband» («Maschinen und Anlagenbau GmbH Perschendorf», Germany);
- ✓ Ergo-spiro-metric system «Meta Max 3B» («Cortex Biophysik GmbH», Germany);
- ✓ Pulse meter «Polar T31» («Polar Electro», Finland).

2. Statistical analysis of results. Mathematical and statistical processing of results was carried out on PC with the help of special programs.

Our research was conducted on August 2012 at Scientific-research institute on base of National university of physical education and sports of Ukraine.

After receiving of oral and written explanation concerning purpose, procedures and potential risks of the researches 29 men (n=29), referees of higher qualification (18 referees of Prime league, 6 referees of first and 5 referees of second leagues of Ukraine) of 21-45 years old age (36.2 ± 5.7 years), gave written agreement for participation in the research.

Results of the research

Determination and evaluation of physical workability is an important functional testing of sportsmen's organism [6].

Different authors understand "physical workability" differently, though closely by sense. In opinion of most of them [4, 5, 6], physical workability is an integral indicator of organism's functional condition and depends on morphological and functional condition of main vital systems and, in the first turn, on condition of cardio-vascular and respiratory systems. That is why physical workability is most often associated with functional potentials of oxygen-transport system of organism.

Studying of football referees' functional condition is important factor in planning of their training process. Hard by scope and intensity physical loads, endured by referees during matches can result not only in over training or reducing of special physical fitness but also facilitate appearing of pathological; changes in organism [14].

In modern training of highly qualified sportsmen computerized physiological methodic, permitting testing of sportsmen's individual functional potentials, are widely used. On the base of obtained data training programs are worked out [10].

Functional potentials of football referees can be determined with the help of the same methodic, on the base of results of functional tests. Results of such tests are quantitative values, received in course of measuring.

In this connection, main task of our research was testing of highly qualified referees' individual functional potentials and evaluation of the obtained quantitative indicators, which, in future, can become the basis for creation of individual programs of referees' special physical training.

In our research referees of higher qualification (18 referees of Prime league, 6 referees of first and 5 referees of second leagues of Ukraine) of 21-45 years old age (36.2 ± 5.7 years), took part.

After finishing of experiment and receiving of individual records of physiological testing of highly qualified referees we entered the obtained data in combined table, in which every referee was marked by personal code.

Analysis of referees', involved in pedagogic experiment, individual functional potentials showed a number of distinctions in their indicators (see table 1).

Table 1

Results of study of functional potentials of highly qualified football referees

Anonymous code referee	V_{max}	V_{max}	T_{xrs}	VO_2	VO_{2max}	VO_{2max}	VO_{2max}	HR	HR	HR	HR^{4th}	HR^{5th}	RER max
	km/h	m/s	m/s	l/m	ml/kg/m	ml/kg0,75/m	ml/kg0,67/m	1st b/m	2nd b/m	3rd b/m	b/m	b/m	
FR-1	20.70	5.75	23:00	5.146	64	85.8	96	183	150	140	139	140	1,60
FR-2	17.1	4.75	18:00	4.831	58	77.6	86.9	185	158	142	137	133	1.22
FR-3	19.8	5.50	21:20	4.511	60	80.2	89.8	180	158	150	145	144	1.21
FR-4	18.90	5.25	20:20	4.419	61	80.7	90.3	200	172	161	157	154	1.25
FR-5	18.90	5.25	20:10	4.998	62	83.3	93.2	181	148	127	117	115	1.18
FR-6	18.0	5.0	19:40	4.354	60	80.5	90.2	162	130	111	107	105	1.28
FR-7	17.10	4.75	18:10	5.089	57	75.4	84.4	170	145	133	126	122	1.18
FR-8	18.0	5.0	19:20	4.912	58	74.4	83.3	167	145	132	125	123	1.22
FR-9	18.0	5.0	19:30	4.385	51	68	76.1	169	135	121	116	116	1.19
FR-10	16.20	4.50	17:40	4.306	59	78.7	88	191	175	160	151	145	1.15
FR-11	16.20	4.54	17:20	4.032	60	80.2	89.8	155	122	112	109	109	1.16
FR-12	18.0	5.0	19:30	4.712	57	76.6	85.8	166	131	119	114	113	1.13
FR-13	17.10	4.75	18:10	4.223	59	78.2	87.5	151	125	109	104	102	1.12
FR-14	18.0	5.0	19:10	4.291	56	71.5	80.1	185	158	140	133	131	1.16
FR-15	17.10	4.75	18:40	5.419	62	82.1	91.9	184	164	145	140	136	1.18
FR-16	17.10	4.75	18:30	4.607	57	75.8	84.9	165	133	119	113	114	1.11
FR-17	15.30	4.25	16:00	4.206	53	70.1	78.5	168	137	124	114	109	1.19
FR-18	18.0	5.0	19:10	4.987	66	87.5	97.9	174	142	123	115	113	1.26
FR-19	16.20	4.50	17:30	3.857	49	65.1	72.9	181	164	150	141	137	1.30
FR-20	18.90	5.25	20:10	5.067	65	86.6	97	175	141	126	121	119	1.23
FR-21	18.90	5.25	20:10	4.927	60	80.1	90	174	151	133	126	123	1.22
FR-22	17.10	4.75	18:30	4.894	58	76.8	85.9	185	164	150	142	139	1.18
FR-23	18.0	5.0	19:10	4.333	58	76.9	86	182	153	133	126	124	1.32
FR-24	17.10	4.75	18:20	4.177	61	80.7	90.4	175	144	128	121	117	1.15
FR-25	18.0	5.0	19:10	4.362	60	79.8	89.2	167	134	120	113	113	1.26

Notes: V_{max} – quickness; T_{xrs} – total time of test's fulfillment; VO_{2max} – maximal oxygen consumption; HR – heart beats rate; RER max – correlation of respiratory exchange.

After systemizing of primary data we faced new task: to determine, which of the received indicators is the most informative and objective reflection of referees' individual functional potentials.

Having analyzed literature in the field of sport physiology and medicine, we determined that many specialists [5, 6] think that maximal oxygen consumption (MOC) reliably characterizes sportsman's workability.

MOC level depends on a number of factors: functional fitness, cardio-vascular and respiratory systems, volume and content of blood and so on; thus this indicator integrally reflects sportsman organism's condition. It explains wide application of MOC indicator as one of criteria of evaluation of sportsmen's physical workability. However, it is not suitable for every kind of physical functioning and, mainly, determines functional condition of organism's systems, which are connected with endurance [10].

Having determined MOC, as indicator, which characterizes sportsman's functional potentials most precisely, we had to create author's methodic, with the help of which we could distribute referees into groups by level of their functional potentials.

Speaking about testing of sportsmen's functional condition we should mention significant contribution of V.L. Karpman [6] in this direction.

Just table, made by V.L. Karpman for evaluation of sportsmen's MOC (outdoor games, martial arts) we took as the basis for classification of referees into groups depending on MOC (see table 2).

All referees of experimental group (n=29) were men older than 18 years old.

Table 2

Classification of referees by groups depending on their MOC

MOC OF SPORTSMEN (OUTDOOR GAMES, MARTIAL ARTS) BY V.L. KARPMAN, 1988					
Level of functional potentials	MOC, ml/min/kg				
	Low < 42	Below middle 40-46	Middle 47-53	Above middle 54-60	High > 60
Quantity of referees (n=29)	–	–	4	17	8

Analysis of individual MOC indicators of highly qualified referees and dividing of them in groups showed that only 8 referees have high functional potentials, the rest 21 referees had indicators at middle and above middle levels.

The data in the table above vividly demonstrate urgency of our research and show that programs of physical training, used for highly qualified referees, are not effective as on the moment.

In the process of experiment, together with determination of general level of aerobic component of functional fitness, we also determined for every referee individual zones of preferable orientation of training loads by heart beats rate.

In theory and practice of sports heart beats rate (HBR) is a physiological indicator, with the help of which it is possible to determine organism's responses to physical load (see table 3).

Table 3

Zones of pulse values of highly qualified football referees

Anonymous code referee	Zones	T1 (recovery)	T2 (aerobic)	T3 (anaerobic threshold)	T4 (anaerobic)
FR-1	HR (b/m)	<158	159-180	181-187	>187
FR-2	HR (b/m)	<162	163-181	182-190	>191
FR-3	HR (b/m)	<137	138-163	164-178	>179
FR-4	HR (b/m)	<162	163-180	181-195	>196
FR-5	HR (b/m)	<145	146-165	166-179	>180
FR-6	HR (b/m)	<130	131-157	158-168	>169
FR-7	HR (b/m)	<144	145-166	167-175	>176
FR-8	HR (b/m)	<134	135-157	158-169	>170
FR-9	HR (b/m)	<145	146-165	166-174	>175
FR-10	HR (b/m)	<154	155-175	176-186	>187
FR-11	HR (b/m)	<149	150-160	161-170	>171
FR-12	HR (b/m)	<156	157-169	170-178	>179
FR-13	HR (b/m)	<150	151-160	161-167	>168

Anonymous code referee	Zones	T1 (recovery)	T2 (aerobic)	T3 (anaerobic threshold)	T4 (anaerobic)
FR-14	HR (b/m)	<150	151-170	171-182	>183
FR-15	HR (b/m)	<142	143-159	160-177	>178
FR-16	HR (b/m)	<159	160-171	172-178	>179
FR-17	HR (b/m)	<135	136-156	157-171	>172
FR-18	HR (b/m)	<157	158-170	171-182	>183
FR-19	HR (b/m)	<137	138-162	163-173	>174
FR-20	HR (b/m)	<130	131-154	155-169	>170
FR-21	HR (b/m)	<132	133-168	169-177	>178
FR-22	HR (b/m)	<155	156-174	175-183	>184
FR-23	HR (b/m)	<140	141-168	169-183	>184
FR-24	HR (b/m)	<140	141-156	157-171	>172
FR-25	HR (b/m)	<152	153-169	170-180	>181
FR-26	HR (b/m)	<154	155-165	166-173	>174
FR-27	HR (b/m)	<150	151-161	162-174	>174
FR-28	HR (b/m)	<150	151-179	180-189	>190
FR-29	HR (b/m)	<147	148-171	172-179	>180

Notes: V_{max} – quickness; T_{xrs} – total time of test’s fulfillment; $VO2_{max}$ – maximal oxygen consumption; HR – heart beats rate; RER_{max} – correlation of respiratory exchange.

HBR indicators for every of preferable zones of loads significantly differ. This shall be considered when dozing training loads and selecting preferable orientation of their influence on referees’ organism in order to achieve maximal effect.

If training loads do not comply with planned and actual characteristics, they can significantly negatively influence on effectiveness of highly qualified referees’ training.

Conclusions:

Main physiological indicators of our researches are: evaluation of MOC and individual training zones of HBR because just these indicators are considered in sports physiology to be the most informative and objective reflection of individual functional potentials of sportsman’s organism.

Having analyzed and systemized the received data, we classified referees depending on their MOC (n-29) in the following way:

- middle level of functional potentials - 4 referees;
- above middle level of functional potentials -17 referees;
- high level of functional potentials - : 8 referees.

Basing on received in our pedagogic and physiological studies data we can make univocal conclusions that all means and methods, which are used by highly qualified referees in special physical training for competitions are not sufficiently effective.

The received by us data will permit, in the future, more precisely specify orientation of training process for differentiated improving of aerobic and anaerobic energy supply of sport workability and individualization of training proves of highly qualified referees.

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