Psychophysiological parameters of qualified athletes, players and biathlonists

UDC 796.072; 159.938; 004.9

Dr. Hab., Associate Professor **N.V. Lutkova**[1]
Dr. Hab., Professor **Yu.M. Makarov**[1]
PhD, Associate Professor **V.F. Lutkov**[1]
PhD, Professor **L.A. Egorenko**[1]
[1]Lesgaft National State University of Physical Education, Sport and Health, St. Petersburg

Corresponding author: nataliya_lutkova@mail.ru

Received by the editorial office on 07.11.2023

Abstract

Objective of the study was to determine the dominant parameters of the psychophysiological state (PPS) in qualified athletes specializing in "sports games and biathlon".

Methods and structure of the study. Vibraimage technology was used with the VibraMed10 program. The objects of the study were highly qualified athletes (candidates for master of sports and masters of sports), specializing in "sports games" (handball, football, rugby) and specializing in "biathlon", who are part of the national teams of St. Petersburg. A total of 28 athletes, 19-22 years old.

Results and conclusions. 1. It has been established that the indicators of aggressiveness, charisma, energy and self-regulation are decisive in the characteristics of high-level gaming athletes. These conditions are significant in the dynamics of the growth of their sports skills. 2. It was revealed that among qualified biathletes, their psychophysiological state is dominated by indicators of balance and self-regulation with subordination of the parameters of inhibition and neuroticism. The growth of professional skills of biathletes is accompanied by directional dynamics of the indicated indicators of psychophysiological state.

Keywords: *vibraimage technology, psychophysiological state, athletes, team sports, biathlon.*

Introduction. Profiling qualified athletes using vibraimage technology allows us to obtain comprehensive information about their psychophysiological state (PPS) [2]. Using vibraimage technology, within 60 seconds it is possible to obtain objective information about the systemic reaction of the athlete's body at the mental, psychophysiological and physiological levels according to ten parameters [5]. Interpretation of complex information about the PPS of qualified athletes, taking into account the type of sport, allows us to identify the leading parameters that are formed in the process of training activities. Parameters of athletes' PPS are revealed in connection with their qualifications; they are necessary for the growth of athletes' qualifications and require formation in training activities. Analysis of the identified general patterns in the dynamics of the parameters of the PPS of qualified athletes, taking into account the type of sport, allows us to detect differences when considering the general values. The data obtained as a result of the study on the specificity of the PPS in qualified athletes, taking into account the type of sport, and the severity of the parameters of their functional readiness can act as goals of the training process.

Objective of the study was to determine the dominant parameters of the psychophysiological state (PPS) in qualified athletes specializing in "sports games and biathlon".

Methods and structure of the study. Vibraimage technology was used with the VibraMed10 program. The object of the study were highly qualified players (candidates for master of sports and master of sports), 28 athletes, aged 19-22 years, specializing in "sports games" (handball, football, rugby) and specializing in "biathlon", included in the national teams of the city St. Petersburg. The proposed technique is based on the principle of transforming video filming into a vibraimage. The recording unit consisted of a video camera and a computer. The subject is positioned in front of the camera at a distance of 80 cm, in a sitting position. Athletes' PFS is assessed using the following indicators: aggression, stress, anxiety, danger, poise, charisma, energy, self-regulation, inhibition, neuroticism. After analyzing the information for each particular characteristic, a conclusion is made, reflected in the final quantitative assessment of the PPS, which allows the resulting state to be correlated with the scale

"excellent", "good", "satisfactory", "bad", indicating the percentage of positive, negative and physiological. The total examination time is 60 seconds. During the testing process, the test subject's psychophysiological reaction is recorded using a web camera installed on the computer, and micro-movements of the head are processed using vibraimage technology [6]. For statistical processing of the obtained results for the sample, the Stat1_60 computer program package was used.

Results of the study and discussion. In order to solve this problem, a study was carried out on the PFS of active qualified athletes, gamers and biathletes at rest. The results of testing of qualified athletes are presented in table 1.

Analysis of the results presented in table 1 indicates that qualified gaming athletes differ from qualified biathletes in terms of aggressiveness, charisma, energy and self-regulation.

According to the developers of the VibraMed10 program [4, P. 53], high indicators of the state of aggressiveness must be analyzed taking into account the average frequency of the vibraimage. Analysis of the state of aggressiveness based on the characteristics of the variability of parameter changes allows us to conclude that gaming athletes are in a state of active concentration when undergoing the examination.

Biathletes showed high levels of balance, charisma and self-regulation. The parameters inhibition and neuroticism characterize the efficiency of physiological processes.

Analysis of the results presented in table 2 confirms the identified dynamics of the studied indicators. Biathletes with the growth of sports skills have the greatest difference in the parameters of poise and self-regulation, charisma. There is a tendency to increase the average values and reduce the variability of the parameter balance and self-regulation.

The conclusion about the dominance of these parameters in their psychophysiological state allows us to state that the growth of professional skills among biathletes over many years of training is accompanied by directional dynamics of the indicated PPS indicators.

Analysis of the results in table 3 confirms the dynamics of the studied indicators among gamers, identified earlier [1, 3].

Highly qualified gaming athletes differ in four parameters that characterize states: aggressiveness, charisma, energy and self-regulation. There is a tendency for average values to increase and variability to decrease. The conclusion about the dominance of the indicators of aggressiveness, charisma, energy and self-regulation in their psychophysiological state allows us to state that the growth of professional skills among gaming athletes over many years of training is accompanied by the directional dynamics of these PPS indicators.

Conclusions. It has been established that the indicators of aggressiveness, charisma, energy and self-regulation are decisive in the characteristics of high-level gaming athletes. These conditions are significant in the dynamics of the growth of their sports skills. It was revealed that among qualified biathletes, their psychophysiological state is dominated by indicators of balance and self-regulation, with subordination of the parameters of inhibition and neuroticism. The

Table 1. *Results of psychophysiological testing by the VibraMed10 program of qualified gaming athletes and biathletes*

Indicators	M±S		Vi (S/M)	
	Sports games (n=14)	Biathlon (n=14)	Sports games	Biathlon
Aggressiveness	37,99±5,90	34,36±7,09	16,14	20,51
Stress	32,67±3,25	42,71±3,97	10,29	9,14
Anxiety	32,47±7,86	36,87±6,89	26,64	18,98
Danger	34,33±3,91	37,41±4,00	11,58	10,70
Equilibrium	64,89±7,62	69,35±6,10	12,44	8,85
Charismatic	71,80±5,50	56,09±7,04	7,98	14,61
Energy	19,70±3,44	16,50±3,38	17,75	20,49
Self-regulation	68,06±5,45	62,36±5,72	8,28	9,53
Braking	16,13±2,72	14,81±1,91	16,39	12,80
Neuroticism	27,19±9,87	19,07±6,87	36,15	35,61

Note: M – average value of the parameter for a given period of time; S – standard deviation of the parameter; Vi – variability of parameter changes.

Table 2. *Results of psychophysiological testing by the VibraMed program of 10 biathletes with the ranks of Candidate Master of Sports, Master of Sports*

Indicators	M±S		Vi (S/M)	
	CMS (n=7)	MS (n=7)	CMS	MS
Aggressiveness	35,46±7,54	34,00±6,95	21,00	20,34
Stress	46,83±3,11	41,34±4,25	6,64	9,97
Anxiety	36,17±6,89	37,10±6,90	19,04	18,96
Danger	38,77±3,65	36,96±4,11	9,43	11,13
Equilibrium	67,01±6,28	70,13±6,04	9,44	8,66
Charismatic	55,00±4,70	56,46±7,82	8,55	16,64
Energy	16,89±3,85	16,38±3,22	19,59	3,28
Self-regulation	60,20±4,95	63,09±5,97	9,96	8,23
Braking	15,04±1,59	14,74±2,01	10,55	13,55
Neuroticism	15,87±4,89	20,14±7,53	30,81	37,21

Table 3. *Results of psychophysiological testing by the VibraMed program of 10 gaming athletes with the ranks of Candidate Master of Sports and Masters of Sports.*

Indicators	M± S		Vi (S/M)	
	CMS (n=7)	MS (n=7)	CMS	MS
Aggressiveness	37,09±6,28	38,37±5,74	18,19	15,26
Stress	37,77±2,74	30,48±3,47	7,20	11,61
Anxiety	34,94±7,14	31,41±8,17	20,55	29,25
Danger	36,90±3,82	33,24±3,94	10,48	12,05
Equilibrium	61,27±7,52	66,45±7,67	12,60	12,38
Charismatic	65,55±8,03	74,48±4,41	12,64	5,99
Energy	17,41±3,30	20,69±3,50	19,83	16,86
Self-regulation	62,52±6,63	70,43±4,94	10,89	7,16
Braking	15,19±2,20	16,54±2,94	14,40	17,25
Neuroticism	22,02±7,80	29,40±10,75	36,23	36,11

growth of professional skills of biathletes is accompanied by directional dynamics of the indicated PPS indicators.

References

1. Lutkova N.V., Makarov Yu.M., Panchenko I.A. Osobennosti psikhofiziologicheskogo sostoyaniya sportsmenov-igrovikov razlichnoy kvalifikatsii. Teoriya i praktika fizicheskoy kultury. 2021. No. 4. pp. 12-14.
2. Lutkova N.V., Makarov Yu.M., Minkin V.A., Nikolaenko Y.N. Profayling kvalifitsirovannykh sportsmenov igrovikov s ispolzovaniyem tekhnologii vibroizobrazheniya. Uchenyye zapiski universiteta im. P.F. Lesgafta. 2019. No. 4 (170). pp. 204-209.
3. Makarov Yu.M., Lutkova N.V. Sinergiya igrovoy agressii v vibroizobrazhenii sportsmenov. St. Petersburg: LEMA publ., 2020. 157 p.
4. Minkin V.A. Vibroizobrazheniye. St. Petersburg: "Renome" publ., 2007. 108 p.
5. Minkin V.A., Nikolaenko N.N. Primeneniye tekhnologii i sistemy vibroizobrazheniya dlya analiza dvigatelnoy aktivnosti i issledovaniya funktsionalnogo sostoyaniya organizma. Meditsinskaya tekhnika. 2008. No. 4. pp. 30-34.
6. Sistema analiza psikhofiziologicheskogo i emotsionalnogo sostoyaniya cheloveka. VibraMed Versiya 10.0. Rukovodstvo po ekspluatatsii. St. Petersburg: Mnogoprofilnoye Predpriyatiye «ELSIS» publ., 2017. 67 p.