

Interrelation of competitive activity indicators, special, physical and functional fitness of highly qualified bmx cyclists

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Abstract

Objective of the study was to reveal the relationship between the indicators of competitive activity, special physical and functional readiness of highly qualified BMX cyclists.

Methods and structure of the study. 10 BMX female cyclists of the qualification Master of Sports and Master of Sports of international class took part in the scientific work. The competitive activity of BMX cyclists was studied at two stages of the BMX Cycling World Cup (Zolder, Belgium). The following performance indicators of competitive activity were recorded: the best time and rating of athletes during the passage of the starting acceleration section (distance section - start and starting acceleration on the ramp) among all participants in the competition; the best time and rating of athletes among all participants in the competition; final place in the protocol of the competition. The functional state of the CNS and the rate of formation of sensorimotor reactions were determined on the basis of a simple and complex visual-motor reaction using the device "Psychophysicologist - UPFT 1/30" (Russia), indicators of reaction time and reaction time standard deviation were recorded.

Results and conclusions. It is shown that the effectiveness of the start, the rating of the participants in the competitions in terms of the best time and place to overcome the distance correlates with the volume of the muscle mass of the body of the cyclists, the functionality of the central nervous system, the speed and stability of the formation of sensorimotor reactions.

Keywords: *BMX female cyclists, special physical and functional readiness, competitive activity.*

Introduction. The study of the relationship between the indicators of competitive activity, special physical and functional readiness of highly qualified athletes underlies the system analysis of the mechanisms for achieving high sports results and optimizing the training process [1, 4].

It has been established that the main factors influencing the level of special physical and functional readiness of highly qualified BMX cyclists are the maximum anaerobic power, special (anaerobic) endurance, the functional state of the central nervous system, and the fractional composition of the labile body mass components [3]. Along with this, experts

point out the high importance for the successful performance of BMX cyclists in competitions of the level of their speed-strength fitness, anaerobic glycolysis power and anthropometric indicators [5, 7, 8, 9, 11].

At the same time, the analysis of the results of the BMX World Championship led researchers [6] to the conclusion that in the BMX race, each section of the track requires a different set of technical and tactical skills, physical qualities and functional capabilities of cyclists.

Special studies aimed at identifying the relationship between the structural characteristics of competitive activity, special physical and functional fitness



of highly qualified BMX female cyclists have not been conducted.

Objective of the study was to reveal the relationship between the indicators of competitive activity, special physical and functional readiness of highly qualified BMX cyclists.

Methods and structure of the study. The scientific work was attended by 10 BMX cyclists with the qualification of Master of Sport and Master of Sport of international class (body length - 163.11 ± 4.17 ; body weight - 61.90 ± 6.27). The competitive activity of BMX female cyclists was studied at two stages of the BMX Cycling World Cup (Zolder, Belgium). The following performance indicators of competitive activity were recorded: the best time and rating of athletes during the passage of the starting acceleration section (distance section - start and starting acceleration on the ramp) among all participants in the competition; the best time and rating of athletes among all participants in the competition; final place in the protocol of the competition.

A week before the start, the level of special physical fitness of cyclists was determined according to the criteria of anaerobic power and endurance in a special bicycle ergometric test 4x5 s: four maximum five-

second accelerations, separated by five-second rest intervals; performed under standard laboratory conditions on a Wattbike Pro bike machine [3]. The maximum indicators of anaerobic power (relative maximum power of the 1st and 2nd repetitions) and special (anaerobic) endurance (relative maximum power of the 3rd and 4th repetitions) were evaluated.

The energy potential of the body of athletes was assessed on the basis of the analysis of the capacity of the lactate mechanism of energy supply. Blood sampling to determine the concentration of lactate was performed at the third minute of recovery after performing a special test. The analysis was carried out by the express method using a portable automatic photometric device Accusport (Germany).

The study of anthropometric parameters included the measurement of body length and weight, four girth sizes of limb segments, seven skin-fat folds on the body and limb segments using a Lange skinfold caliper (USA). The labile components of body weight (fat and muscle mass) were calculated. All measurements were taken on the right side [2].

The functional state of the central nervous system and the rate of formation of sensorimotor reactions were determined on the basis of a simple (SVMR) and

Indicators	M	σ	Start		Best result		Final place	Acceleration, W/kg				La 3' restore	
			Time	Place	Time	Place		1	2	3	4		
Start	Time	2,76	0,04	1,000									
	Place	10,63	8,12	0,816*	1,000								
Best result	Time	37,25	1,25	0,921*	0,762*	1,000							
	Place	13,50	8,41	0,817*	0,873*	1,000	1,000						
Final place		10,87	5,56	0,753*	0,716*	0,912*	0,945*	1,000					
Acceleration, W/kg	1	20,45	1,54	-0,753*	-0,840*	-0,534	-0,531	-0,322	1,000				
	2	18,68	1,58	-0,617	-0,795*	-0,448	-0,496	-0,276	0,935*	1,000			
	3	16,59	1,48	-0,783*	-0,954*	-0,706	-0,788*	-0,565	0,895*	0,862*	1,000		
	4	14,98	1,36	-0,900*	-0,970*	-0,856*	-0,900*	-0,776*	0,822*	0,788*	0,920*	1,000	
La 3' restore		17,70	1,99	-0,581	-0,712*	-0,407	-0,474	-0,336	0,718*	0,757*	0,646	0,753*	1,000

* - identified statistically significant relationships ($p < 0,05$)

TABLE 1. AVERAGE VALUES AND COEFFICIENTS OF CORRELATION OF INDICATORS OF EFFECTIVENESS OF COMPETITIVE ACTIVITY AND SPECIAL PHYSICAL FITNESS OF HIGHLY QUALIFIED BMX CYCLISTS

Indicators	M	σ	Start		Best result		Final place	MM%	FM %	SVMR	SVMR SD	CVMR	CVMR SD	
			Time	Place	Time	Place								
Start	Time	2.76	0.04	1.000										
	Place	10.63	8.12	0.816*	1.000									
Best result	Time	37.25	1.25	0.92*1	0.762*	1.000								
	Place	13.50	8.41	0.817*	0.873*	1.000	1.000							
Final place		10.87	5.56	0.753*	0.716*	0.912*	0.945*	1.000						
MM%		52.31	0.88	-0.719*	-0.801*	-0.625	-0.703*	-0.598	1.000					
FM %		12.09	2.42	0.869*	0.919*	0.852*	0.912*	0.856*	0.884*	1.000				
SVMR		222.37	15.53	0.910*	0.727	0.833*	0.727*	0.606	-0.501	0.668	1.000			
SVMR SD		45.25	23.57	0.539	0.742*	0.403	0.518	0.397	-0.590	0.590	0.525	1.000		
CVMR		364.00	60.62	0.937*	0.671	0.889*	0.72*6	0.655	-0.622	0.652	0.863*	0.247	1.000	
CVMR SD		73.63	32.32	0.778*	0.857*	0.566	0.582	0.346	-0.516	0.611	0.773*	0.655	-0.440	1.000

* - statistically significant relationships were identified (p<0.05)

TABLE 2. MEAN VALUES AND COEFFICIENTS OF CORRELATION OF INDICATORS OF EFFECTIVENESS OF COMPETITIVE ACTIVITY AND FUNCTIONAL STATE OF HIGHLY QUALIFIED BMX CYCLISTS

complex (CVMR) visual motor reaction using the device “Psychophysiolologist - UPFT 1/30” (Russia), the reaction time and the standard deviation (SD) of time indicators were recorded. reactions.

Statistical data processing was performed by the method of correlation analysis using the standard statistical software package Statistica-10.

Results of the study and their discussion. In table 1 shows the average values and correlation coefficients of the indicators of the effectiveness of competitive activity and special physical fitness of BMX female cyclists.

A high interrelation between the indicators of start efficiency, anaerobic power and endurance, as well as the possibilities of mobilizing the lactate mechanism of energy supply was revealed.

The indicators of competitive activity “the best time and place of overcoming the distance in the rating of participants in the competition” and “the final place in the protocol of the competition” had a high correlation with the indicators of anaerobic endurance (relative power of the third and fourth acceleration in a special test).

It should be noted that the metabolic capabilities of the lactate mechanism of energy supply correlated with the indicators of anaerobic power and endurance recorded in the laboratory test, which indirectly con-

firms the high importance of the mobilization capabilities of the lactate mechanism of energy supply for the achievement of high sports results by BMX cyclists.

Table 2 presents the average values and correlation coefficients of the indicators of the effectiveness of competitive activity and the functional state of BMX female cyclists.

It was revealed that the efficiency of the start correlates with the volume of muscle mass (MM%) of cyclists, the functional capabilities of the CNS (SVMR, SVMR SD), the speed and stability of the formation of sensorimotor reactions (CVMR, CVMR SD). It is shown that an increase in the volume of fat mass reduces the possibility of an effective start of athletes.

The indicators of competitive activity “the best time and place to overcome the distance in the ranking of participants in the competition” and “the final place in the protocol of the competition” also correlate with the indicators of the fractional composition of the body of athletes. For cyclists, who are distinguished by higher sports results, a larger amount of muscle mass and a smaller amount of body fat are characteristic.

Also, a direct relationship was found between the functional capabilities of the central nervous system and the speed of formation of sensorimotor reactions with the rating of the participants in the competition in terms of the best time and place to



overcome the distance. It is shown that the higher the speed of a simple and complex visual motor reaction, the better the time and the higher the place in the ranking of the competition participants. Apparently, the lower psycho-physiological indicators of female cyclists limit the possibilities of realization and technical and tactical potential in the process of competitive struggle at a distance.

Conclusions. It has been established that the effectiveness of the competitive activity of highly qualified BMX cyclists has a high correlation with the results of a special bicycle ergometric test 4x5 s on a Wattbike Pro bike machine. Indicators of anaerobic power (relative power of the 1st and 2nd accelerations) and the capacity of the lactate mechanism of energy supply characterize the efficiency of the racers at the start, and indicators of anaerobic endurance (relative power of the 3rd and 4th accelerations) characterize the capabilities of BMX cyclists in the struggle for high place in the final part of the competition (final protocol). It is shown that the efficiency of the start, the rating of the participants in the competitions in terms of the best time and place to overcome the distance correlates with the volume of muscle mass (MM%) of the cyclists, the functionality of the central nervous system, the speed and stability of the formation of sensorimotor reactions.

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