

Influence of Functional Asymmetry on the Manifestation of the Ability to Maintain Balance in Highly Qualified Sambo Wrestlers

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ABSTRACT

An assessment of the functional state of cadets studying at the Police Academy of the Ministry of Internal Affairs of Uzbekistan showed that despite the fact that the surveyed contingent of sambo wrestlers is high in terms of sports qualifications and they are all masters of sports, their functional capabilities in terms of physical performance, as well as in terms of maximum oxygen consumption and lung vital capacity differ. Athletes have been identified, both with high reserve capabilities and with low indicators of physical performance. Testing with eyes closed made it possible to obtain more objective information about the state of the ability to maintain balance. The regulation of balance and control of posture is carried out due to the muscular sense, which involves proprioceptive sensitivity receptors, and not due to the visual analyzer.

KEYWORDS: sambo, cadets, functional asymmetry, physical performance, aerobic capabilities.

The relevance of research. In the modern sports world, there is a tendency to constantly increase the requirements for the body of athletes and the task of coaches in training athletes is not to consolidate the results achieved at the previous Olympics, but to achieve new higher results. However, the morphological and functional reserves of a person have a limit of capabilities - this means that the long-term influence of extreme loads on the athlete's body can lead to depletion of reserve capabilities, as well as to an increase in the risk of sports injuries or the occurrence of pre-pathological and pathological deviations in the athlete's health. One of the factors that reduce the performance of athletes is muscle-tonic asymmetries arising not only in the structures of the musculoskeletal system, but also in the right and left sides of the trunk (Belenko I.S., 2009, Bredikhina Blum Yu.E., 2009, Yu. P., Guzhov F.A., Kapilevich L.Ch., Ilyin A.A., 2015).

The degree of research of the problem: It is known that the asymmetry of the body from an anatomical point of view is a genetically determined trait. For example, asymmetry in the manifestation of signs of dermatoglyphics on the right and left hand should not normally exceed 4% - 5%. A higher percentage of asymmetry is considered evidence of the presence of a "genetic load" in an individual or at the level of an integral population (Safarova D.D., et al. 2020, 2021). Functional muscle asymmetry is not a pathology, such changes occur under the influence of a specific one-sided load that an athlete experiences during a long-term training process. Despite this fact, the difference in the development and functional state of the muscles of the right and left sides of the trunk often leads to disorders, not only of the neuromuscular and ligamentous apparatus of the musculoskeletal system, but also affects the coordination abilities, keeping the body to balance (Gribanov A.V., Sherstennikova A.K., 2013, Gorbachev D.V., Gondareva L.N., Valtsev V.V. 2010). Violation of the function of maintaining balance and coordination of body movements leads to technical errors when performing various techniques. The above was the justification for this research.

The goal of the research. Influence of functional asymmetry on the manifestation of the ability to maintain balance in highly qualified sambo wrestlers.

Research methods: We examined 20 highly qualified sambo wrestlers who are masters of sports in sambo, studying at the Academy of the Ministry of Internal Affairs of the Republic of Uzbekistan. Functional asymmetry was detected by anthropometry by measuring the distance between anthropometric points: from the location of the center of gravity of the body to the upper point of the iliac spine. Coordination capabilities and body balance preservation were judged by the "Swallow" test and Yarotskiy's test, Romberg's test. When comparing the results of a preliminary study assessing the ability to maintain balance, there are no significant differences between the control and experimental groups, $P \geq 0.05$.

Physical development was assessed on the basis of measurements of total body size and mass-growth index. The use of physiological methods made it possible to assess the level of physical performance using the PWC-170 method, and the Maximum oxygen consumption indicator testified to the level of fitness and aerobic capabilities of the sambo wrestlers' bodies. The pedagogical experiment is aimed at testing the methodology of using corrective exercises. For the experimental group, a complex of corrective physical exercises was developed, implemented within the framework of

ISSN 2792-3983 (online), Published under Volume: 1 Issue: 5 in October-2021

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the method of myocorrection of functional asymmetry, which was introduced into the training process. The participants in the control group, who also had functional asymmetry, performed a standard training program.

Research results and their discussion: Sambo refers to asymmetric sports, in which moving tasks are performed by both the right and left sides of the body, upper and lower extremities, characterized by the difference in the solution of moving tasks by the right and left sides. Already in the first phase of standing, a sambo wrestler can take a left-sided or right-sided standing, and the body and the constituent segments of the body are in a forced asymmetric posture. When choosing a standing, the athlete chooses the side from which it is more convenient for him to carry out defensive and attacking actions. The arm and leg on the priority side perform several functions: controlling the enemy and attacking actions. At the tackle, the wrestler with the priority hand makes a tackle for the lapel of the opponent. In the tackle phase - the purpose of which is to bring the body out of balance, the body part makes monotonous oblique movements in the same direction, or its spine is twisted along the vertical axis. The partner carries out the same movements. Athletes usually perform throwing techniques by increasing muscle tension on the priority side. Trying to bring the body of the attacked out of balance, which occurs after the vertical line of the body lowered from the center of gravity goes beyond the area of support, the body begins to fall. Depending on the leading side, there is an increase in the tested load either on the right or on the left side of the body (Shestakov M.P. 2010).

At the same time, constant control and accompaniment of the throwing action is ensured not only due to large muscular efforts from the side of the priority hand, but also due to the high tension that the muscles on the leading side of the body experience.

Since the projection of the center of gravity is shifted towards the leading side, this negatively affects the quality of balance and the level of the athlete, which in turn is one of the features of the activities of sambo wrestlers: have high rates of posture retention in a rapidly changing situation and at the same time it is necessary to maintain balance. In conditions of increased static loads, there is a state of hypertonicity of the superficial muscles of the back, which are in a state of tension and shortening. To identify perspective athletes, characterized by high physical performance and aerobic capacity, we assessed the functional state of sambo wrestlers on the basis of physiological research methods (Table 2)

Assessment of physical development and dynamometry indicators of highly qualified sambo wrestlers

Table 1

	Full name	qualification	physical development			Dinamometrics					
			height	weight	MRI	right hand			left hand		
						N1	N2	restore	N1	N2	restore
1	Boyarkin I.	MC	168	60	357,1	34	36	36	24	26	28
2	Ibragimov Sh.	MC	166	68	373,4	38	42	40	40	38	42
3	Makhmudov N.	KMC	170	64	376,4	38	36	36	32	36	34
4	Khasanbaev S.	MC	179	90	502,78	38	38	52	54	56	50
5	Najmiddinov S.	MC	170	70	411,7	40	40	40	42	43	44
6	Gulomov Sh.	MC	175	70	400,0	54	52	52	54	54	52
7	Allamberganov	MC	182	83	456,0	48	46	44	45	42	42
8	Khuzhabaev U.	MC	170	74	435,29	46	42	44	48	48	46
9	Ashurov V.	MC	185	85	499,4	54	58	60	56	56	60
10	Sultanov M.	MC	175	90	520,0	38	38	38	28	34	32
	$\bar{x} \pm \sigma$		174±6,3	75,4±10,8	433,21±59,1	42,8±7,2	42,8±7,3	44,2±8,02	42,3±11,3	43,3±10,2	43±9,8

Physical working capacity PWC170, IPC - 170 on standard load

Table 2

№	Full name	qualification	Physical working capacity			MOC		MOC evaluation	VCL l/min
			kgm / min	watt	abs	rel .			
1	Boyarkin I.	MC	1217,1	202,8	3.747	62.4	good	3,7	
2	Ibragimov Sh.	MC	1147,7	191,2	3.594	57.9	average	3,6	
3	Makhmudov N.	KMC	1384,1	230,6	4.115	64.2	good	3,5	
4	Khasanbaev S.	MC	2480,7	413,4	6.526	72.5	excellent	3,6	
5	Najmiddinov S.	MC	1484,4	247,4	4.335	61.5	good	3,5	

ISSN 2792-3983 (online), Published under Volume: 1 Issue: 5 in October-2021

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6	Gulomov Sh.	MC	1508,3	251,3	4.338	62.2	good	4,1
7	Allamberganov	MC	1349,7	224,9	4.039	48.6	short	3,3
8	Khuzhabaev U.	MC	2444,1	407,3	6.447	87.1	excellent	5,0
9	Ashurov V.	MC	2256,8	376,1	6.035	71.0	excellent	3,5
10	Sultanov M.	MC	1333,9	222,3	4.004	44.0	short	2,9
	$\bar{x} \pm \sigma$		1660,7±520,2	276,7±86,7	4,72±1,15	63,1±12,2		3,7±0,56

The highest indices of both physical working capacity and aerobic capabilities were found in the following sambo wrestlers: Khasanbaeva S.-PWC170 - 2480.7 kg / m / min, Khuzhabaeva U. ; -PWC170 - 2441.1, Ashurov V.- 2256.8- PWC170- 2256kg / m / min (Table 2). It should be pointed out that the cadets identified by us also had excellent indicators of the aerobic capabilities of the organism on the basis of informative indicators such as the maximum oxygen consumption (MOC) of the vital capacity of the lungs (VC). Good indicators of physical working capacity, MOC and VC were found in cadets Boyarkin I., Makhmudov N., Nadzhmitdinov S., Gulomov Sh. However, with a properly set training process, these cadets can achieve higher results. We have evaluated the results of testing cadets in static tests for the ability to maintain body balance (Fig. 1).

Duration of maintaining body balance in statometric tests "swallow", "test Yarotsky" (Fig. 1)

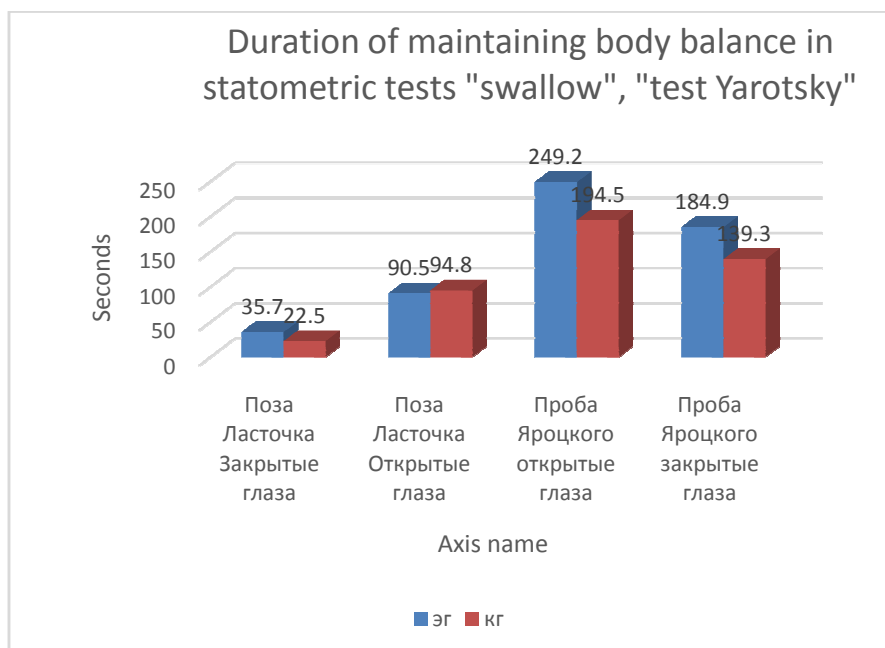


Table 3 - The results of assessing the ability to maintain balance (Romberg's test) before and after the pedagogical experiment (n = 20, sec)

Statistical indicators	Experimental group -n = 10				Control group - n = 10			
	(open eyes) before	(Open eyes) after	(closed eyes) before	(closed eyes) after	(open eyes) before	(Open eyes) after после	(closed eyes) before	(closed eyes) after
M	39,5	47,7	23,2	27,4	38,3	37,3	22,7	22,6
±δ	8,5	6,4	5,7	7,3	8,5	6,8	5,5	3,6
Statistical inference	P≤0,05		P≤0,05		P≥0,05		P≥0,05	

In the control group reliable differences between the results obtained before and after the study are not observed, indicating a lack of positive dynamics of statokinetic stability in the conditions of the preservation of muscle-tonic asymmetries (Table 3). The experimental group shows positive dynamics characterized in the increase of manifestation level of balance ability in sambo wrestlers. It should be noted that due to the decrease of muscle tension there is relaxation of the muscles, accompanied by lengthening of the most loaded muscles, which indicates muscle recovery.

This state of the muscles ensures the accuracy of technical and tactical actions and, as a consequence, a clearer intermuscular coordination. Also the effect of carrying out corrective measures is an increase in time of keeping balance in the test with eyes closed, which is clearly shown in Fig. 1 and Table 3. Conclusion: Assessment of functional state of cadets studying at the Academy of the Ministry of Internal Affairs of the Republic of Uzbekistan showed that despite the fact that the examined contingent of sambo wrestlers has a high level of sports qualification and all of them are masters of sports, however their functional capabilities in physical efficiency as well as in terms of MOC and VCL are different. Athletes with high reserve capabilities have been identified, who can be recommended for participation in prestigious sports competitions in sambo. However, 3 sambo wrestlers showed low functional capabilities, and coaches should pay attention to the development of special physical training in the training process. Testing with eyes closed made it possible to obtain more objective information about the state of the ability to maintain balance.

The regulation of balance and control of posture is carried out due to the muscular sense, in the provision of which proprioceptive receptors of sensitivity participate, and not due to the visual analyzer.

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