Correction of the torso position of female sprinter athletes based on changes in postural balance

UDC 796.015.58

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Received by the editorial office on 07.11.2023

Abstract

Objective of the study was to provide a methodological substantiation of the effect of postural balance on the correction of the body position of an athlete when covering a distance.

Methods and structure of the study. Generalization and interpretation of established axioms in the training of female sprinters justified the need to conduct a pedagogical experiment using the proposed methodology, the basis of which was adapted means from fitness programs using a Bosu platform for the development of postural balance and functional TRX loops for strengthening stabilizer muscles.

Results and conclusions. The effectiveness of the technique was confirmed by statistically significant differences in the results of running 60 m before and after the experiment. It has been established that exercises on TRX loops, a bosu platform and a fitball contribute to the development of coordination abilities and the ability to control the body in space, both in a supported and unsupported position. Positive dynamics of statokinetic indicators in female sprinters was achieved through targeted improvement of postural balance and increasing the strength potential of the muscles that ensure the maintenance of static and dynamic balance.

Keywords: *sprinters, postural balance, stabilizer muscles, center of body mass, supporting function of the foot.*

Introduction. Sprint is considered one of the most dynamic and spectacular disciplines in athletics, requiring rational running technique and the development of speed qualities. Sprinting includes running at a distance from 30 m to 400 m. Sprint running along a distance includes 4 phases: start, starting run-up, running along a distance and finish. The result is recorded at the moment of touching the imaginary finish plane with any part of the body, excluding the head, neck, arms and legs [2]. In the preparation of a sprinter, the leading place is occupied by the development of a controlled position of the torso when shifting the overall center of body mass (OCBM) in each phase of movement, which contributes to the technical economization of the athlete's movements [5, 7, 9]. To maintain balance and strengthen the trunk muscles, the targeted use of variable fitness programs is relevant [4, 6, 8].

During the study of special scientific literature and pedagogical observation of the educational and training process of highly qualified athletes, it was established that the physical training of sprinters is focused only on the development of leg muscles and speed abilities. Insufficient attention is paid to body position control during distance running. This approach also negatively affects the training results of track and field sprinters.

Objective of the study was a methodological substantiation of the effect of postural balance on the correction of the body position when female athletes cover the sprint distance.

Methods and structure of the study. The study used a meta-analysis of information in the field of fitness and sprinting.

Generalization and interpretation of established axioms in the training of female sprinters justified the need to conduct a pedagogical experiment using the proposed methodology, the basis of which was adapted means from fitness programs using a Bosu platform for the development of postural balance and TRX functional loops for strengthening stabilizer muscles [1, 3].

The study was carried out on the basis of pedagogical observation and analysis of the training process of qualified female sprinters of the I-KMS category (n=18), who trained 3 times a week according to the proposed methodology for six months.

Training corrections involve a targeted change in methodological approaches and resource functionality of the training process under the influence of external and internal factors that determine the direction, nature and depth of the impact of training technologies. In this regard, emphasis has been placed on fitness programs that increase the dynamic and static strength of the trunk muscles.

The proposed complexes included exercises selected taking into account the largest number of muscle groups covered in the work, performed in various modes (dynamic, static and statodynamic):

- to develop the supporting function of the feet, contributing to the maintenance and management of the overall center of body mass;

- to maintain balance on a solid support, on a limited support (beam, one leg), on an unstable one (bosu platform, fitball, balance disc);

- to strengthen the torso muscles that provide left and right rotation (turn), the flexor and extensor muscles of the torso, using a fitball;

- to improve the interaction of superficial and deep muscles, aimed at optimizing muscle tone using TRX loops (one-arm row at an angle with body rotation; lifting the buttocks in the side plank);

- to develop flexibility and increase elasticity of the whole body with the help of TRX loops.

When performing the complexes, the athletes adhered to the specified characteristics: number of repetitions and series, load intensity, rest pauses. Variable methods of sports training were used (alternating, repeated, interval, circular).

Results of the study and discussion. Testing at the end of the experiment determined the nature of the relationships between the rate of increase in results in general physical and special exercises and made it possible to assess the representativeness of the use of adapted fitness programs in the process of training female sprinters.

A comparative analysis of the development of speed-strength and coordination abilities of female athletes before and after the end of the experiment is presented in the table.

Before the experiment, the athletes showed the following results in the long jump: standing – 237.6±16.9 m, back forward – 132.6±34.0 m, with a 180° turn to the right and left 175.3±39.6 m and 170.5±36.3 m, respectively, which indicates a low level of control in space. During initial testing, the running time for 30 m from the move was 3.61 ± 0.26 s, from the start – 4.67 ± 0.39 s; at 60 m – 8.04±0.18 s. In tests assessing the ability of female sprinters to maintain balance on an unstable support, the results were average: maintaining balance in a stance

Dynamics of physical fitness indicators of track and field athletes, $\bar{X}\pm m$

Tests		Before	After	t
Long jump, cm	from place	237,6±16,9	250,1±39,4	2,2
	backwards	132,6±34,0	144,6±5*	4,4
	with 180° rotation (to the right)	175,3±39,6	196,5±26,7*	1,7
	with 180° rotation (left)	170,5±36,3	188,4±42,6*	3,7
30 m run, s	from the start	4,67±0,39	4,43±0,23	2,4
	on the move	3,61±0,26	3,46±0,33	4,3
60 m run, s	from the start	8,04±0,18	7,51±0,23	3,1
Stand on one leg on a bosu platform, s	on the right	46,8±11,7	72,8±7,6*	3,1
	on the left	41,4±9,3	68,3±8,2*	3,7
Kneeling on an unstable support (fitball), s		53,4±5,7	96,6±4,9*	4,8

*Note: * – level of significance of differences at $p \le 0.05$.*

on the right and left leg on a bosu platform - 46.8 ± 11.7 s and 41.4 ± 9.3 s, respectively, and in a kneeling position on a fitball – 53.4±5.7.

After the pedagogical experiment, the results improved in all control exercises. The increase in results in percentage terms is most significant in the long jump with a turn of 180˚ to the right and left - 10.7% and 9.57%, respectively, and in tests for maintaining static balance on an unstable support: in a standing position on the right leg - 36.1 %, in a standing position on the left – 39.7%, in a standing position on the knees – 44.8%.

Based on the results of the pedagogical experiment, it was found that the standard cyclic movement of a sprinter depends on the control of body position while running along a distance. A stable working posture was formed as a result of the development of the ability to maintain static and dynamic balance.

The effectiveness of this technique was confirmed by statistically significant differences ($p \leq 0.05$) in the results of running 60 m before and after the experiment; the time improved from the start by 0.53 s, the increase was 7.1%.

Test results indicate the effectiveness of the methodology for developing postural balance using adapted fitness program tools. Positive dynamics of statokinetic indicators was achieved through targeted improvement of the proprioceptive system and increasing the strength potential of the muscles that maintain balance.

Conclusions. During the pedagogical study, it was established that the main task of postural control is to maintain the position of the torso during movement and restore balance when exposed to external factors. The versatility and effectiveness of the method for correcting the torso position of female sprinters lies in the focus of training on TRX loops, a bosu platform and a fitball to work on stabilizer muscles that contribute to the development of coordination abilities and skills of body control in space in a supported and unsupported position.

Adapted fitness program tools help create a powerful foundation for the safe and high-quality development of sports running technique.

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