Enhancing the efficiency of the offensive attack for experienced volleyball players, considering their physical balance metrics

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Abstract

Objective of the study was to increase the effectiveness of an offensive strike among skilled volleyball players, it is important to take into account the body's balance.

Methods and structure of the study. The evaluation of volleyball activities was conducted within the framework of the St. Petersburg Championship for men's teams in the 2022-2023 season. A customized version of the Data Volley software was employed to monitor the progress of competitive performances. To pinpoint a single technical and tactical action, the video camera was positioned behind the front line of the court, and the effectiveness of the offensive strike was assessed in accordance with the classification outlined in the manual for this software. A total of 32 matches between the two teams were analyzed. The study aimed to assess the readiness of the players to execute an offensive strike. The analysis of body balance indicators was conducted using the ST-150 stability platform. The experiment involved exercises designed to strengthen the muscles responsible for maintaining body balance. The study involved 24 volleyball players, representing the SSHOR Ekran and Peterburgaz teams.

Results and conclusions. 1. It has been confirmed that the initial indicators of physical equilibrium and balance control in volleyball teams are consistent. 2. The appropriateness of incorporating exercises to enhance the muscles responsible for maintaining physical equilibrium has been established in three distinct areas: strengthening the musculoskeletal system of the ankle joint, strengthening the muscles of the back and spine, and developing jumping ability and managing physical equilibrium. 3. It has been observed that the improvement in jumping performance is closely linked to the development of physical equilibrium and balance control in volleyball players. 4. It has been determined that the players in the experimental group significantly improved their performance in executing offensive strikes during competitive matches.

Keywords: *body balance, means, efficiency, skilled volleyball players.*

Introduction. Volleyball regulations provide for an increase in the number of competitive events. Powerful and fast attacking hits in modern volleyball often determine the outcome of a match and require specialized training of players [5]. When improving an attacking hit, the issue of developing jumping ability as “the ability to maximize concentration of muscular and volitional efforts in a minimum period of time when overcoming vertical and horizontal distances” remains relevant [3, 7]. Jumping ability indicators for an attacking hit depend on the axis and plane of the human body during the run-up and jump phase [1]. The balance of the human body is maintained by the coordinated activity of the skeletal muscles under the control of the cerebral cortex. Body vibrations are indirectly recorded by the movement of the projection of the general center of gravity along the support area [6, 4]. The narrowly targeted exercise blocks identified during the study help strengthen the skeletal muscles that ensure the balance of the body. Body balance and balance control indicators contribute to the growth of jumping ability indicators, which determine the effectiveness of an attacking hit by qualified volleyball players. The results can serve as goals for the training process.

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For statistical processing of the obtained results from the sample, the Microsoft Office Excel 2021 and STATGRAPHICS 18 computer software package was used.

Results of the study and discussion. The analysis of the performance indicators of the attacking strike and jumping ability indicators of the male volleyball players shows that the teams participating in the study are homogeneous. At the first stage of the experiment, no significant differences were found in the indicators of balance and body balance control among the players of the Ekran team, 49,01±19,26 and 48,25±14,58 points, and PetersburgGaz, 48,91±15,56 and 53,0±18,66 points, respectively. To conduct the pedagogical experiment, exercises were determined to strengthen the muscles that maintain balance. The exercises are grouped into three target blocks:

Block 1. Strengthening the muscular-ligamentous apparatus of the ankle joint.

Block 2. Strengthening the muscles of the back and spine. Block 3. Developing jumping ability and improving balance control. The following load dosage was envisaged when performing the compiled exercises during the training session: six exercises performed in series (four series), with a rest interval between series of 1-2 minutes [2]. Examples of exercises are shown in the figure.

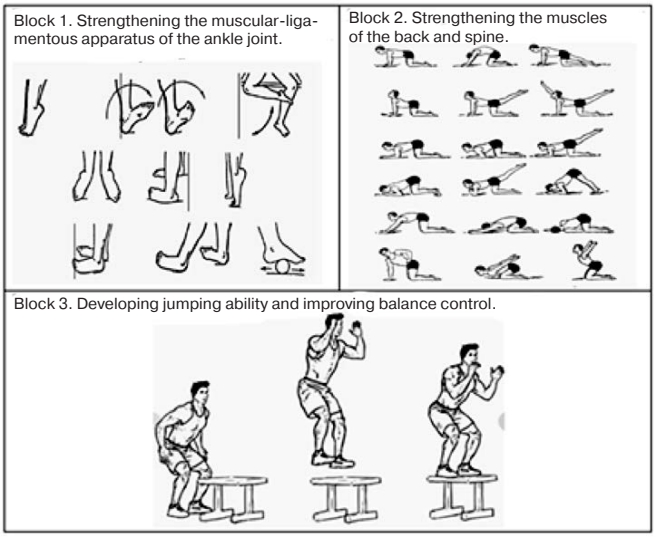

Figure 1. Examples of exercises in three blocks

A repeated study of the balance indicators in the experimental group shows that the balance and body balance control indicators have positive dynamics and correspond to the assessment well: 74,66±15,33 points and 79,0±13,5 points. In the second group, no increase in the balance and body balance control indicators was found: 48,25±14,58 and 53,0±18,66 points. A comparative analysis of the studied indicators of both groups shows the presence of statistically significant differences between them. During repeated testing, significant differences in jumping ability indicators in three tests were determined between the groups (Table 1).

The results of the testing allow us to state that the use of exercises in the training process, the target set-

Table 1. Volleyball players' jumping performance after the experiment

Indicator	(X±Sx)		P-value	Conclusion on the difference
	EG	CG		
Jump up from a standing position, cm	67,16±1,38	64,58±1,18	0,0057	p≤0,05
Jump up after three steps, cm	71,33±1,22	67,66±1,06	0,0021	p≤0,05
Jump up after three steps reaching the height, cm	299,25±1,34	291,0±1,46	0,0001	p≤0,05

Table 2. Efficiency of the attacking strike in two groups before and after the experiment

Indicator	Group	(X±Sx)	
		Before	After
Attacking Strike Efficiency,%	Experimental	34,22 ± 1,66	41,81 ± 1,73
P-valu		0,0023	
Conclusion on the Difference		p≤0,05	
Attacking Strike Efficiency,%	Control	34,5±1,81	35,26±1,43
P-valu		0,1846	
Conclusion on the Difference		p>0,05	

ting of which is to strengthen the muscles that ensure the maintenance of balance, is appropriate, this contributes to the increase in jumping ability of volleyball players. The dynamics of the efficiency indicators of the execution of an attacking strike of two groups during the competitions is presented in Table 2.

An analysis of statistical recording of the effectiveness of the attacking strike in a team of qualified volleyball players, whose participants performed specialized exercises to strengthen the muscles that ensure the maintenance of balance, made it possible to establish a significant increase in the studied indicator.

Conclusions. 1. It was established that the initial indicators of body balance and equilibrium management in volleyball teams are homogeneous. 2. The expediency of identifying exercises to strengthen the muscles that maintain body balance in three target blocks (to strengthen the muscular-ligamentous apparatus of the ankle joint; to strengthen the muscles of the back and spine; to develop jumping ability and body balance management) was determined. 3. It was revealed that the growth of jumping indicators is accompanied by the dynamics of indicators characterizing body balance and balance management in volleyball players. 4. It was determined that the effectiveness of performing an attacking blow during competitive activities significantly increased in the players of the experimental group.

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