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## **IMPROVEMENT OF GAME ACTIONS IN BEACH VOLLEYBALL**

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**Key words:** beach volleyball, psychomotor apparatus, training, assessment of motor characteristics, choice reaction, concentration of attention.

**Annotation.** The lack of a differentiated training system for beach volleyball players makes them look for ways to improve. A clear distribution of movements in short intervals of time, one's own efforts in terms of spatial parameters using concentration of attention, which determines the worked out options of positive outcomes through a complex choice reaction, significantly increase the effectiveness. In beach volleyball, the use of the aforementioned psychomotor characteristics at the time of each serve determines the concept of the formation of developmental exercises. It is suggested to use tests as markers characterizing changes in motor criteria. The study was carried out in the open beach stadium located in Angarsk with 13-17 year old boys and girls, as well as adults who regularly participated in the training and playing process during the summer seasons of 2018-2020 in a total of 140 people. The training impact lasted six months and amounted to 180 hours, including introductory and final testing. The control and experimental groups in 2018 included 22 people each, in 2019 – 25 people each, and in 2020 – 23 people each. The division order is random. As a result of the study, the indicators of characteristics of participants in the experimental group, in regard to the control group, increased in all tested parameters, as evidenced by the calculation of the t-criterion. In the preparation of athletes by specialization, it is effective to apply the training influence on psychomotor parameters prevailing in the given specificity. The interpretation of psychomotor elements in beach volleyball is scientifically novel and qualitatively complements the existing basics of training.

**Introduction.** Almost all players of the modern beach volleyball came from classic volleyball, which is a clear sign of retraining [1]. World practice shows the regularity of achieving high results by athletes who engage in only one sport, which is related to mastering technical features [2].

The purpose of this study is to develop an approach to improve game actions of athletes in beach volleyball using psychomotor means.

External signs influencing a feature of motor characteristics involved in game situations: a soft and grainy surface that supports the resistance when pushing-off resisting interferences; changing trajectory of a ball due to the wind, which leads to unstable reflexes; a small number of members in a team, which increases loads applied in the game [3]. Aside from such physical loads as jumps and accelerations, a player is subject to specific psychomotor loads during the match [4]. Almost each serve has its own variability defined by a player through a complex choice reaction and differentiating sensitivity of movement parameters [5]. When an opponent makes a move, players, based on their game roles and agreements, occupy a part of the field in a short period of time for defensive actions. As a rule, at this moment a higher player who plays the role of the blocker shows a combination option behind their back, which only defines a side that they are ready to defend. Further actions of that player depend on a success of a move performed by an opponent and a possibility to perform a convenient pass for an offensive move [6]. If the move appeared to be not successful and the pass went at an acute angle to the net or was warded off, which excludes strong and confident offence, the blocking player can decide not to block, but move into the zone they wanted to block for making a defensive move. The second player who plays the role of the defender tries to receive the ball, so that the blocker would be able to make an offensive move by touching the ball again. This tactical decision is repeated in almost every serve. Strategy of the game is directed towards the fastest identification of the strongest player in offence and defense, which defines a serve's direction and offence in the spike, as well as a possibility to perform a blocking move or moving back to play in defense.

Taking into account the described tactical option that is most frequently used in beach volleyball, it is reasonable to create a training complex that enhances not only physical, but also mental characteristics in order to improve results of the game.

Effectiveness of different types of serves, passes and offensive moves in beach volleyball was studied by experts who concluded that tactical actions directed towards receiving game points serve as a factor of achieving success [4, 7]. Scientists from Spain managed to reveal physiological reactions in players in different game positions and identify zones of intensity and recovery. Experts also modeled a movement of a peak level of technical and tactical implementation into the game process [8-9].

Authors suggest that the good serve either supports the possibility to win a point or makes it difficult to make a pass for the opponent's team, which increases changes for a win by the serving team [10].

Researchers from Spain analyzed schemes of defense in beach volleyball: the “left-line, right-move” scheme – player on the right takes the blocker role, player on the left – the role of a defender, who is located on the baseline; the “left-move, right-line” scheme – player on the right takes the defender role, player on the left – the blocker role. It was established that the second scheme was used more frequently due to a greater height of blockers compared with defenders. Higher players take the fourth position on the field, which gives more opportunities to make offensive moves. Playing in defense from the second zone requires better parameters of speed, dexterity and agility that lie at the basis of defending tactics used for localization of the opponent’s offensive moves [11-12].

Scientific works became a foundation for the study of motor characteristics applied in crucial moments of the game [13]. Theories and methods of sports training, theory and methods of training in general in sports games, beach volleyball also were used as a basis for the study [2, 14, 15, 16].

**Methods and organization.** Forming the process of improving the repeating tactical and technical game moment that influences the result was made from a description of motor characteristics, a choice of tests for identification of results and developmental exercises. In order to register reliability of results, we conducted an experiment. During three summer seasons of 2018-2020 on a beach stadium of the “Ermak” sports school located in Angarsk, young boys and girls at the age of 13-17 years participated voluntarily and with their parents’ consent (for underage children), as well as adults who are amateurs in beach volleyball and have sufficient experience and level of physical fitness (140 people in total). Total time of training took 180 hours, including time taken for testing. Every season, players were divided into experimental and control groups: in 2018 – 22 people each, in 2019 – 25 each, in 2020 – 23 people each. There were all divided in a random order.

Psychomotor characteristics were tested for identifying results before and after applying loads. The change in these characteristics was calculated according to the Student’s t-test [17]. Exercises for developing characteristics were formed under the principle that is approximate to game actions. We shortened the interval of making a decision and registered its accuracy. The choice reaction in volleyball, i.e. the time of making a decision and processing within the latent psychomotor period of the muscle response to the brain’s neuro-signals, can be shortened through concentration of attention and frequency of making such decisions and positive outcomes that build up player’s experience.

The differentiating sensibility of movements has three main concepts: difference in time intervals, in effort and in spatial parameters [18]. Each motor characteristic has its own effect on the process. The differentiating sensibility in time forms a moment for the blocking player for a short acceleration from the net to the

defense position or vice versa. The moment of performing the move should exclude a possibility to identify movements of the opponent, but it should also form a stop to concentrate on defense or blocking. The spatial differentiating sensibility defines a precise acceleration interval, jumping up on the block that excludes touching the net with hands and a sense one's own field in order to include opportunities to make game actions from jumping up from the block etc. The differentiating sensibility in effort have a distinct feature in moments of touching the ball, where the serve's result stands in as the serve outcome.

Table 1

Tests that identify the psychomotor development

№	Test	Description
1	For the strength and spatial differentiating sensibility	1.1. Throwing a solid ball (1 kg) with both hands behind the neck while standing with an effort of 100%, 70%, 50%, 100%. The hit control is performed by the coach according to the scale. Control of effort. 1.2. Control of the impact point without the scale control 100%, 70%, 50%, 100%. Control of space.
2	For the strength and spatial differentiating sensibility	2.1. Standing long jump with an effort of 100%, 70%, 50%, 100%. The hit control is performed by the coach according to the scale. Control of effort. 2.2. Control of the impact point without the scale control by the test subject. Control of space.
3	For the differentiating sensibility in time	3.1. The test subject must identify short time intervals of 5-7-12 s. The exercise performed with a stopwatch, without the scale control. 3.2. Same as a previous exercise but with using short physical exercises (for abdominal muscles, arms and legs). Control of time.
4.	For the differentiating sensibility in time with anaerobic abilities	4.1. Same as the 3.1 exercise but with breath hold on inhale. 4.2. Same as the 3.1 exercise but with breath hold on exhale.
5.	For the strength differentiation	5.1. Measuring wrist dynamometry with an effort of 100%, 70%, 50%, 100% and without visual control by the test subject. Control of effort.
6.	For the spatial differentiation	6.1. Drawing a 5-7-12 cm curve with a pen. Measurements are made with a curve meter. Control of space.
7.	For voluntary and anaerobic abilities and endurance	7.1. Breath hold (on inhale) with a simultaneous control, throwing tennis balls with one hand while sitting on a chair, the distance to a basket is 1,5 meters. 7.2. Same exercise, but with breath hold on exhale.
8.	For the complex choice reaction	8.1. Using the "Reaction time indicator" program

## Exercises for developing needed skills

Individual work with a ball	
1.	<p>1.1. Player performs following moves: hitting the net's center, bump reception, hitting the ball to the net. They perform these exercises facing the net on the spot, or while moving to the right/left.</p> <p>1.2. Player performs a throw with two hands aiming at the net from the baseline.</p> <p>1.3. Player catches the ball, then makes an offensive move over the net, aiming towards the set direction, and goes back to the baseline.</p> <p>1.4. Facing the net, a player hits the net with the ball, then receives it and makes an offensive move again (1.2).</p> <p>1.5. Facing the net, a player performs a maximum high throw, then jumps on the block, performs a short acceleration with the back for two-three steps while landing and receives the ball.</p>
Individual work or paired work with two balls	
2.	<p>2.1. Juggling two balls (subsequent ball throwing with two hands with a transition to a receive)</p> <p>2.2. Two balls serve (a player throws the first ball high, then hits the second ball fast and hits the first one after).</p> <p>2.3. In pairs, players pass the ball.</p> <p>2.4. One player attacks the another one with two balls: one player attacks, another one throws. A receiving player works on a receive accuracy and switching moves.</p> <p>2.5. Subsequent throwing at different sides, a player takes the defender role, performs acceleration and accurate pass to the throwing player.</p>
Blocking moves	
3.	<p>3.1. One player gets ready to perform blocking actions. Another player stands on the opposite side in the middle of the field and throws tennis balls over the net. The blocking player catches or deflects the ball with their wrist. The more complicated version: blocking actions are made with the opposite hand, if the ball moves to the right – with the left hand, if the ball moves to the left – with the right hand.</p> <p>3.2. A player makes an offensive move while standing on a stand. A blocker jumps and tries to catch the ball (3.1.), the stand is moved closer or further from the net each five hits. The offensive move gradually becomes stronger.</p> <p>3.3. (3.2.) A player shows that they are going to jump to make a blocking move but then moves back and receives the ball.</p> <p>3.4. (3.3.) A player gets ready to receive the ball in the middle of the field. After throwing the ball at the player on the stand, the blocking player performs acceleration to the net with a short stop then jumps on the block. Options to make the exercise harder: a player has to either show the combination of zone blocking at the right time after a short acceleration, or return to their zone for a receive, or return to the opposite zone.</p>
Basic exercises	
4.	<p>4.1. A player gets ready to perform an acceleration to the corner of the field diagonally from the net to receive the ball after a sound signal (3.2.) on a turn or without a sound signal. Then they perform blocks, closing a direction of the move. Then they perform spotting of their blocking and make an offensive move from the pass at the end.</p> <p>4.2. A game action starts from the opponent's offensive move over the net (strong, weak, with changing zones) from the right or from the left. The main task is to keep the ball in game.</p> <p>4.3. Same as the (4.2) exercise, except actions of the blocker are controlled by a sound signal of their partner to make a block or to receive the ball.</p> <p>4.4. A player gets ready to receive the ball in the middle of the field. Three players are standing with their back to the net. They throw the ball simultaneously to make an offensive move. Behind the receiving player, another player is standing; they signal with their hands, which the player is going to make a move. One is making a move, two other are imitating it. The receiving player trains their concentration through improving the choice reaction.</p>

Therefore, we can assume that main motor characteristics used at the technical and tactical moment of serve are the differentiating sensibility that has main three parameters and the complex choice reaction. Testing of aforementioned characteristics is advisable to carry out using approved methods (table 1). Developmental exercises (table 2) should be constructed from preliminary to basic ones that are approximate to the game process. Exercises for developing psychomotor abilities and special endurance can be performed with hypoxic breath hold on inhale (20-30 s) and exhale (5-7 s) [8].

**Results and discussion.** Testing results in the control (CG) and experimental (EG) groups before and after the experiment (table 3) and reliability of results in differences were calculated between the KG and EG after the experiment.

Table 3

Results of testing CG and EG before and after the experiment

Test	CG		EG		Significance of differences		
	before	after	before	after	t	p	
1	1.1.	16,8±1,9	18,9±1,4	18,3±1,7	24,1±1,8	3,24	<0,05
	1.2.	17,4±2,3	18,6±2,4	18,6±2,2	23,7±1,8	3,71	<0,05
2	2.1.	169±17,5	174±15,3	171±16,5	180±17,1	9,65	<0,05
	2.2.	165±14,3	171±13,8	176±14,2	187±16,6	12,37	<0,05
3	3.1.	14,8±3,9	16,8±3,8	15,3±3,4	18,8±4,2	9,08	<0,05
	3.2.	14,6±3,3	15,5±4,1	15,7±3,8	18,3±4,4	9,31	<0,05
4	4.1.	11,6±5,5	13,5±4,4	14,2±3,4	15,6±4,3	8,32	<0,05
	4.2.	6,7±3,4	6,8±4,3	5,8±5,3	8,2±4,8	5,66	<0,05
5		34,8±7,6	37,3±5,8	34,5±6,7	42,3±4,5	5,39	<0,05
6		36,4±4,4	35±7,6	33±8,2	37±4,4	4,96	<0,05
8		328	312	297	253	6,68	<0,05

Considering results of the study and the suggested experiment, we can assume that the proposed method is effective and useful. Trained motor characteristics that have a direct influence on the result demonstrated a growth rate in all trained parameters. Implementation of psychomotor loads into sports training improves total performance through the development of sensorimotor coordination and “dexterity” parameters. Interaction of players according to the suggested methodology allows them to achieve mutual understanding and teamwork, creates mental connection between players, teaches them nonverbal communication and faster decision-making.

**Conclusion.** By carrying out the review of foreign references on modern world tendencies of the beach volleyball’s development, we acquired data on following features: technical and tactical training for performance of a serve, biomechanics of jumps on the sand surface, differences of physiological reactions of players considering their position on the field, technical and tactical models of

game activity, psychological training, effectiveness of the psychomotor control and precision of performing in-game elements.

Results of the study and the conducted experiment helps to broaden professional knowledge of coaches and experts in beach volleyball in issues of sports training in this specialization.

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