THE PROBLEM OF IMPROVING DEFENSE TACTICS AND WAYS TO SOLUTION IN THE GAME OF VOLLEYBALL

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Abstract: The article discusses the problem of improving defensive tactics in volleyball. Based on pedagogical observations of the competitive activities of highly qualified volleyball players, the team effectiveness of defensive actions was determined. Ways to solve the problem of optimizing defense tactics in the field are given.

Key words: Volleyball, problem, attractiveness, attack, defense, pedagogical observations, actions, efficiency, solutions.

It is known that a large part of the entertainment value of volleyball matches lies in the effective defensive actions of individual players and the team as a whole. Selfless, effective play in defense, "rescuing" hopeless balls, repelling strong attacking blows from the opponent attracts wide sections of the public of various ages, professions and social groups to the volleyball courts, "cheer" for their favorite teams, which is an excellent incentive for organizing their leisure, healthy image and lifestyle. Therefore, to prevent a highly emotional game of flying ball from turning into a boring exchange of blows, the defensive potential of teams in general and players defending on the field in particular should be constantly increased.

Unfortunately, in modern volleyball there is a significant predominance of attacking actions over defensive ones [1; 2]. This is due to a significant increase in the skill of attacking players, an increase in their anthropophysical indicators, the rapid pace of improvement of attack techniques and tactics, and changes in the official rules of competition refereeing.

This trend, which emerged in the middle of the last century, continues its progressive offensive today and has a number of negative consequences:

•a decrease in the entertainment and attractiveness of the game process has a negative impact on the popularization of volleyball among the population and, as a consequence, on the reduction in the influx of young people into sports schools;

•lack of replenishment of masters teams with promising young athletes;

•some loss of the leading positions of Russian volleyball on the world stage.

The material presented above served as the basis for our research, namely, pedagogical observations of the competitive activities of master volleyball players. The purpose of our study is to determine the effectiveness of defensive actions of highly qualified volleyball players in competition conditions.

Analysis of the results of pedagogical observation of competitive activity made it possible to establish that of all the attacking blows performed by the opponent during the match, only 65.4% of the attacking blows pose a direct threat to the defense of the opposing side in the field. The remaining 34.6% of shots are distributed as follows: 20% are made into the opponent's block, 14.6% into the net, out or with technical errors made by attacking players (touching the net, holding the ball, etc.).

Distribution of offensive strikes across attack zones and defensive performance (%)

Attack zone	Offensive strikes completed	Efficiency of protective actions
2	30.9	32.9
3	21.6	36.5
4	47.5	46.0
Average efficiency		38.5

The study of video recordings led to the conclusion that the largest number of attacking blows are made from zone 4 - 47.5 (see table).

At the same time, the effectiveness of protective actions when taking them is 46%. From zone 2, the opponent attacks in 30.9% of cases with a defensive efficiency of 32.9%. The opponent completes the least number of attacks in zone 3 - 21.6%. The efficiency of receiving offensive strikes from zone 3 is 36.5%. It should be noted that there is a significant range in the effectiveness of protective actions. In some encounters, the effectiveness of protection does not exceed 30%. The maximum efficiency of receiving offensive blows recorded by us is no more than 48%

Thus, the study found that the average effectiveness of defensive actions in the field (receiving attacking blows) under competitive conditions is 38.5%.

Low indicators of the effectiveness of defensive actions require further thorough research of the conditions and factors of the indicative activity of volleyball players playing in defense. The authors suggest the following ways to improve defensive tactics in the field:

1) identification of typical game situations typical for defensive actions in the field;

2) determining the probability distribution of ball hits into the court during opponent attacks in typical game situations;

3) studying the duration of the ball flight phase after performing attacking strikes in various zones of the volleyball court in typical game situations;

4) study of the speed capabilities of volleyball players when moving over short distances (2-5 m) in various ways (facing forward, back forward, side steps, etc.).

With this approach and solution to the problem of optimizing defense tactics, it is possible to develop rational tactical formations for volleyball players that repel the opponent's attacks. The use of optimal formations of defending players in sports practice will contribute to a qualitative increase in the effectiveness of the game in defense.

All functioning systems of sports activity are characterized by the fact that they are probabilistic in nature. In this regard, modeling of sports activity is probabilistic, or stochastic.

The probabilistic nature of game situations in volleyball (in the "attack-defense" system) is predetermined by the various options for attacking actions of players (serve, attacking strike, etc.), which are performed with passes that have different spatio-temporal parameters (height and speed of pass, distance of the ball from the net etc.), and various systems for organizing the defensive actions of the defending team.

Mathematical modeling is one of the main methods used in solving problems of tactical training of teams. The purpose of mathematical modeling is, based on the analysis of existing (a priori) and (new) information obtained as a result of research, to determine the optimal ways to overcome the opponent's opposition. It should be noted that the ability of an athlete to independently find ways to solve complex tactical problems under the strict time limit characteristic of modern competitive activity does not arise on its own, spontaneously, but is developed on the basis of previously acquired knowledge, based on the ability to perform the correct actions in simpler situations. conditions. This means that any tactical situation, despite its variability, will not be new for the player. The method of mathematical modeling, with this approach to solving problems of tactical training, allows, following from simple to complex, from typical game situations to non-standard situations, to identify the most common and essential components of tactics, to determine the relationship of each part to the whole, to reveal the picture of interaction between parts in creating a holistic image of activity in the process of sports play.

In recent years, mathematical models have been widely used in studying the tactical actions of volleyball players both in attack and defense. In our opinion, the technology for developing a mathematical model of tactical actions in volleyball, presented in Fig. six-stage "model" research structure developed by E.M. Braverman.

At the first stage of mathematical modeling, the final goal of the modeling is determined. In our study, the ultimate goal is to optimize the tactical actions of volleyball players in defense.

At the second stage, postulation occurs, mathematical formalization of a priori information, and, if possible, experimental verification of a number of assumptions.

e	Determining the ultimate goal of modeling
2-stage	Pre-model analysis of the process under study Creation or selection of a model (general view)
3-stage	Creating or selecting a model (general view)
4-stage	Statistical analysis of the model
5-stage	Model verification
6-stage	Model refinement

1.Fig. Structure of a "model" study (according to E.M. Braverman)

The third stage can be called the actual modeling stage, since it includes the direct derivation of the general form of model relationships, i.e. the structure of the model is determined, its symbolic analytical notation, in

which, along with known numerical values, there are quantities whose physical meaning is determined, but whose numerical values are not.

The fourth stage - statistical analysis of the model - is devoted to solving problems of the best selection (by statistical estimation) of unknown parameters included in the analytical record of the model, studying the properties of the obtained estimates, and their accuracy. At this stage, typical game situations that arise when playing defense are determined, an analysis and probabilistic description of the distribution of ball hits into the volleyball court during opponent attacks is carried out, the speed capabilities of players are studied, and optimal positions of players are developed when organizing defensive actions on the field.

At the fifth stage (model verification), procedures are used for comparing model conclusions, assessments, consequences and conclusions with actually observed competitive activity and checking the reliability of the developed model of tactical actions of volleyball players in defense in sports and gaming conditions.

The presence of the sixth stage - model refinement - depends on the results of the previous stage and consists of conducting research to correct the model, which is necessary not only in conditions where the model does not give positive results in a real game environment, but is also used to improve the model based on constantly incoming information about progressive changes in defensive tactics.

The complexity of constructing a mathematical model of protective actions is aggravated by the fact that competitive activity in team sports is characterized by conflict in game situations. A conflict situation is characterized by difficulty in making decisions and implementing actions due to their wide variety, lack of time, spatial limitations, insufficient information, masking the real intentions of the opponent, etc.

The theoretical basis for studying the actions of athletes in conditions of competitive confrontation is considered to be game theory, which considers problems associated with the choice of optimal behavior of players, taking into account the possible actions of all participants in the competition. The expediency of using game theory to study sports tactics has been repeatedly noted in special literary sources.

One of the basic concepts in game theory is strategy - some plan, so comprehensive that it cannot be violated by the actions of the enemy... since everything that the enemy can do... along with the set of your possible actions is part of the description of the strategy [5]. Thus, the strategy of a player (team) is a complete listing of all actions that this player (team) takes in each of the possible positions during the game, whether it arises by chance or will be created as a result of the opponent's move (or the player's own move). However, the concept of strategy should not be interpreted too naively: once a player chooses a strategy, his every move at any stage of the game is determined in the sense that he already knows in advance the entire sequence of moves that he will make, no matter how his opponent plays. On the contrary, "strategy" refers only to the rule that determines a player's choice of his next move based on what happened earlier in the game. Typically, when describing a game, all possible actions (good or bad) are considered to be possible strategies.

In the theory of games of two or more participants with opposing interests or, in other words, in the theory of antagonistic games, it is quite natural for the player to choose the optimal strategy that allows him to rationally make decisions to implement his tactical plan. An optimal strategy is a strategy that, when the game is repeated many times, provides a given player with the maximum possible average payoff. During a volleyball match, the defender must choose his strategy and make decisions in close cooperation and interaction with his teammates, i.e. coordinate your strategy with the strategies of other defending players and ensure the highest

efficiency of the team's defensive actions. This is the player's strategy that can be called optimal. The choice of the optimal strategy is carried out on the basis of the maximin principle, which consists in maximizing the minimum ("guaranteed") winnings of player 1. It is quite obvious that the maximin principle from the point of view of player 2 takes the form of minimax, i.e. minimizing maximum losses.

The proposed approach to the problem of optimizing the tactical actions of volleyball players, when mathematical modeling is used in the context of game theory, creates additional opportunities for understanding sports and gaming activities, obtaining the most complete, reliable information about the object and subject of research, which ultimately transforms into better quality the process of improving the tactical actions of volleyball players in defense.

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