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Pedagogical characteristics of the systems for assessing the technical and tactical skills of qualified volleyball players

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Purpose: *on the basis of the analysis of the special literature and their own experimental studies, to determine the characteristics of the systems for assessing the technical and tactical skills of qualified volleyball players.*

Material & Methods: *study was conducted on the basis of the material of the national team of Zaporizhzhya State Medical University on volleyball. Analysis and generalization of the data of scientific and methodical literature are used; registration, analysis and interpretation of indicators of technical and tactical actions of qualified volleyball players in training and competitive processes; pedagogical observations; algorithms for calculating the quantitative and qualitative indicators of technical and tactical skill in volleyball; methods of mathematical statistics.*

Results: *data on the existence of a strong statistical relationship between the systems of assessment of technical and tactical skills of qualified volleyball players, taking into account the specificity of the game role.*

Conclusion: *shows the specifics of the application of various systems for assessing the technical and tactical skills of qualified volleyball players, taking into account the factors of the game role, noted the methodological features of special analysis and interpretation of indicators of technical and tactical actions in the adversarial process.*

Keywords: *volleyball, qualification, role, evaluation, skill, technique, tactics, training, competitions.*

Introduction

Increasing the level of competition and social significance of official international competitions (Olympic Games, European championships and the world) requires further improvement of technologies and management system for the training of qualified athletes. Ukrainian volleyball has a long tradition of training qualified and highly qualified athletes – the names of famous Ukrainian volleyball players Mikhail Pimenov, Yuri Poyarkov, Viktor Mikhalchuk and many other outstanding athletes are well known to the world and European volleyball specialists. Unfortunately, in recent years the level of sports achievements of Ukrainian club and national teams has significantly decreased. As an exception, which confirms the general trend, it is possible to give examples of victorious performances of men's and women's national teams of Ukraine in the volleyball Euroleague 2017.

The reasons for the decline in the level of sports preparedness of Ukrainian volleyball players are complex, which is due to both economic factors in the country and directly to certain shortcomings in the system of long-term training of athletes. In our opinion, the influence of global factors significantly affects the training activity of qualified athletes in volleyball and requires a significant correction of the entire process of long-term preparation and the factors that determine it. This refers to the uncontrolled migration of young prospective athletes to leading clubs or abroad, which significantly reduces the level of competition at the national level and the development of national volleyball in general. In these conditions, the methodical systems for assessing the technical and tactical skills and the technology of training athletes for official competitions need correction.

The problems of assessing the level of technical and tactical skill in volleyball are not entirely new in the scientific and methodological literature. To the authors who started solving this scientific problem at the dissertation level, L. N. Slupsky (1974) [7], who conducted a study of the specialization of functions of athletes in the highly temporal conditions of gaming activity. To assess the level of technical and tactical skill of the players, the "point guard" role is suggested by a methodical approach, based on the method of conditionally-coded registration and stenographic recording of the game performance indicators with the determination of the effectiveness of technical and tactical skill according to formula (1):

$$E = \frac{N}{p_1 \times 1 + p_2 \times 0{,}5 + p_3 \times 0{,}2 + 0 + p_5^{(-1)}}, \quad (1)$$

where E – effectiveness of technical and tactical skill, N – total number of pass performed in the plane of the attacking actions; p_1 – number of pass for attacking technical and tactical actions without blocking; p_2– number of pass for attacking technical and tactical actions against the other blocker; p_3 – number of pass for attacking technical and tactical actions against group blocking; p_4 – number of ineffective gear for attacking technical and tactical actions; p_5 – number of false pass for attacking technical and tactical actions.

C. Dávila-Romeroetal et al. (2015) note that the proposed system for assessing the effectiveness of technical and tactical actions is specific because of its inability to apply to players of other gaming roles – diagonal, setter, central blocking [9].

But in the work of A. Yu. Melnyk (2011) [5] noted the significant influence of psychological factors on the effectiveness of technical and tactical actions in the competitive process of volleyball players. The author suggests additionally using the integral indicator of the quality of communication, which is calculated by the formula (2):

$$IQC = \sum_{i=1}^{3} n_i \times C_i \ , \qquad (2)$$

where the IQC – indicator of the quality of communication; n_i and C_i – number and value of the amount of communication (AC) of the other type (an index i = 1, 2, 3 is constitutive, encouraging or critical communication, respectively)

Such tendencies were noted in the work of R. Meletakosetal et al. (2013) [10], which focus on higher levels of sporting performance in volleyball teams with active communication between coaches and athletes. It is shown that this factor positively influences the psychological climate and the effectiveness of technical and tactical actions in the competitive process in general.

V. V. Gamaliy, O. L. Silesia (2014) [1; 2] proposed an alternative technology for assessing attacking technical and tactical actions in volleyball, with the possibility of further interpretation of the components presented, which are determined by the percentage of winning balls when individual attacking interactions are applied to the total number of attacking technical and tactical actions performed using formula (3):

$$EAA = \frac{P_{wv} + P_{esh} + P_{cr} + P_{tf} + P_{zn} + P_{rr} + P_{crs} + P_{js}}{n} \ , \qquad (3)$$

where EAA – effectiveness of attacking actions; P_{wv} – winning points when applying GTTA "wave"; P_{ech} – winning points when applying GTTA "echelon"; P_{cr} – winning points when applying GTTA "crucifix"; P_{tf} – winning points when applying GTTA "take-off"; P_{zn} – winning points when applying GTTA "zone"; P_{rr} – winning points when applying GTTA "rear"; P_{crs} – winning points when applying GTTA "cross"; P_{js} – winning points without applying GTTA "just"); n – total number of attacking actions.

For a more reliable representation of the effectiveness of technical and tactical actions in volleyball, the authors recommend that only effective GTTA be taken into account. The merits of this method of assessing the effectiveness of attacking TTA include a wide arsenal of used interactions, which allows us to more fully reflect the game statistics and the ability to determine the contribution of each attacking TTA in the overall population.

In the study, E. Yu. Doroshenko (2012) [6] proposed a comprehensive approach to assessing the level of technical and tactical skill of qualified volleyball players according to formulas (4 and 5):

$$IETTS = \left(\frac{1}{Q} \sum_{i=1}^{Q} K_{ij} \right) \times 100 \ \% \ , \qquad (4)$$

where IETTS – indicator of the effectiveness of technical and tactical skills in volleyball, %; Q – amount of basic technical and tactical actions (TTA) (Q=1, ... 5); i –number of technical and tactical actions (i=1, ... 5); j – optimality index for the performance of the technical and tactical action (j=1 – optimal execution, j=2 – performance with complication for the opponent's game); C_{1j} – coefficient of effectiveness of serve in volleyball, cond. units; C_{2j} – coefficient of efficiency of reception the ball after serve in volleyball, cond. units; C_{3j} – coefficient of effectiveness of attacking strikes in volleyball, cond. units; C_{4j} – coefficient of effectiveness of blocking attacking strikes in volleyball, cond. units; C_{5j} – coefficient of effectiveness of defensive actions in volleyball (reception the ball after attacking and deceptive strikes), cond. units.

$$C_{ij} = \frac{1}{N} \sum_{i=1}^{2} N_{ij} \ , \qquad (5)$$

where *Cij* – coefficient of effectiveness of technical and tactical action in volleyball, cond. units; N – specific technical and tactical action in volleyball, n; N_1 – a specific technical and tactical action in volleyball, which is performed optimally, n; N_2 – a specific technical and tactical action in volleyball, which is performed with complication for the opponent, *n*.

As a result of the experimental studies carried out by the author, the possibilities for correcting the management system of the preparation and competitive activity of athletes in volleyball are shown, and the levels of technical and tactical skill are determined depending on the quantitative and qualitative indicators of the effectiveness of technical and tactical actions (Table 1).

Each of the described methods has both advantages and disadvantages. A common drawback is the lack of a certain algorithm for analyzing and interpreting the obtained indicators of technical and tactical skill. In the works of V. Kostyukevich (2016) [4], N. Schepotina (2015) [8] it is rightly noted that for further analysis of the indicators of technical and tactical actions in volleyball, it is necessary to use the model characteristics of technical and tactical actions in competitive activities. Moreover, such scientific developments on the material of team sports games have already been covered in the monograph of E. Yu. Doroshenko, D. G. Serdyuk, A. A. Mitova [3].

Despite the rather detailed scientific development of questions regarding the optimal assessment of the indicators of technical and tactical skill in volleyball, the problems in the analysis and interpretation of the indicators of technical and tactical actions, the practical implementation of which allows us to obtain more information, remain unresolved in the theory and methodology of sports training in the chosen sport

Table 1

Scales for assessing the level of technical and tactical skill of volleyball players, taking into account the role, %

Levels of technical and tactical skill	Values of performance indicators of technical and tactical skill of volleyball players of different roles, %	
	Hitters, diagonal and central blocking players	Setters and "libero" players
Low	<25	<30
Below the average	25,01–35	30,01–40
Average	35,01–45	40,01–50
Above average	45,01–55	50,01–60
High	>55	>60

(volleyball) for the implementation of assessment and control measures of technical and tactical preparedness.

Relationship of research with scientific programs, plans, themes. Pedagogical studies were conducted in accordance with the plan of research work of the Department of Physical Rehabilitation, Sports Medicine, Physical Education and Health of the Zaporizhzhya State Medical University of the Ministry of Health of Ukraine on the topic "Optimizing the physical condition of students by means of physical education and sports in the conditions of a medical higher educational institution". The research topic corresponds to the Consolidated Plan of research works in the field of physical culture and sports for 2016–2020. Ministry of Youth and Sports of Ukraine on the theme "Theoretical and methodological foundations of programming and modeling of training of athletes of various qualifications" (state registration number 0116U005299).

The purpose of the research: on the basis of the analysis of the special literature and their own experimental studies, to determine the characteristics of the systems for assessing the technical and tactical skills of qualified volleyball players.

Material and Methods of the research

Experimental studies were conducted on the basis of the men's national team of the volleyball team of the Zaporizhzhya State Medical University, in the seasons 2015–2016 and 2016–2017 participated in the competitions of the city and regional levels, the championship of the Zaporizhzhya branch of the Committee on Physical Education and Sport of the Ministry of Education and Science of Ukraine, volleyball tournaments of the regional levels. Contingent of athletes participating in experimental studies – 15 people: 3 candidates for the master of sports; 10 athletes of the first category and 2 athletes – the second category. Schedule of the training process: Monday, Tuesday, Thursday, Friday. Competitive practice: Saturday or Sunday.

Research methods: analysis and generalization of scientific literature and Internet; the study of advanced pedagogical experience; pedagogical observations; analysis of competitive activities on the basis of written registration of indicators of technical and tactical actions; methods of mathematical statistics.

Results of the research and their discussion

During the 2015–2016 and 2016–2017 seasons, volleyball players of the national team of the Zaporizhzhya State Medical University were registered indicators of competitive activity. To analyze the effectiveness of attacking technical and tactical actions, the following indicators of competitive activity were selected: the number of points scored (n) the effectiveness of the serve (%); effectiveness of attacking technical and tactical actions (%); blocking efficiency (%). Tables 2 and 3 show the competitive performance of volleyball players of the national team of the Zaporizhzhya State Medical University in the official competitions of the 2015–2016 and 2016–2017 seasons.

The pedagogical analysis of the indicators of competitive activity, which are presented in Tables 2 and 3, makes it possible to determine the effectiveness of technical and tactical

Table 2

Indicators of the number of scored points and effective attacking technical and tactical actions in the competitive activity of qualified volleyball players different playing roles, n=10

Role	Scored points, n_1		Effective attacking TTA, n_1	
	$\bar{X}$±m	S	$\bar{X}$±m	S
Diagonal	10,24±0,94	2,92	11,08±0,71	2,76
Setter	8,19±0,48	1,67	8,95±0,51	1,72
Central blocking	5,4±0,33	1,22	5,25±0,51	1,46
Libero	2,23±0,22	0,87	1,42±0,19	0,62

Remark. *n – number of games; n_1 – values of indicators.*

Table 3

Indicators of blocking and effective serve in the competitive activity of qualified volleyball players different playing roles, n=10

Role	Blocking, n_1		Effective serve, n_1	
	$\bar{X}$±m	S	$\bar{X}$±m	S
Diagonal	1,29±0,18	0,49	1,07±0,17	0,53
Setter	1,19±0,19	0,55	0,98±0,15	0,47
Central blocking	2,78±0,36	0,93	0,91±0,17	0,54
Libero	1,02±0,15	0,48	0,78±0,18	0,56

Remark. *n – number of games; n_1 – values of indicators.*

actions of qualified volleyball players by different methods of evaluation with obtaining quantitative and qualitative values. This is significant for determining the model characteristics of qualified volleyball players of various roles and creating on this basis the conditions for the rational planning of training and competitive loads in the structural formations of the macrocycle (mesocycles and microcycles). To determine the effectiveness of various methods of assessing technical and tactical skill in volleyball, a correlation analysis of the obtained indices was made with the determination of the Brava-Pearson correlation coefficient, which showed the presence of strong statistical relationships. For comparative analysis, a method of assessing technical and tactical skill in volleyball [6] and a technique for assessing the effectiveness of attacking technical and tactical actions [2] with a modification by definition of blocking indicators with the same logic as for determining the attack interactions. Indicators of technical and tactical actions of qualified volleyball players are recorded in 10 games of regional and regional levels, of which 5 – won and 5 – lost (Table 4).

With the general trend of a relatively strong statistical dependence of the indicators of competitive activity in the games won and lost, pay attention to the performance of players which playing role "setter": r=0,89 and r=0,68, respectively, which may indicate the presence of certain differences in the structure of competitive activity in depending on the outcome of the games.

In addition, we consider it important to combine the recorded indicators of quantitative and qualitative assessment of technical and tactical skills in a generalized structure. In our opinion, it must have internal hierarchical subordination and contain the following elements: 1) analysis of the effectiveness of the implementation of team gameplay: in attack, in defense;

Table 4

Indicators of statistical dependence of the systems of assessment of technical and tactical skill of qualified volleyball players, n=10

Playing role	Indicators of statistical dependence of various systems of technical and tactical skill assessments			
	r – correlation coefficient (won games)	level of statistical dependence	r – correlation coefficient (lost games)	level of statistical dependence
Diagonal	0,86*	strong, p<0,01	0,74**	strong, p<0,01
Setter	0,77*	strong, p<0,01	0,71**	strong, p<0,01
Central blocking	0,89*	strong, p<0,01	0,68**	strong, p<0,01
Libero	0,84*	strong, p<0,01	0,83**	strong, p<0,01
Total	0,84*	strong, p<0,01	0,74**	strong, p<0,01

Remark. ** – method for assessing the technical and tactical skills in volleyball; ** – a technique for assessing the effectiveness of attacking technical and tactical actions.*

2) analysis of the effectiveness of the implementation of group interactions in the attack, in defense; 3) analysis of the effectiveness of individual actions in the attack, in defense (including players of different roles) 4) analysis of the effectiveness of the implementation of standard provisions (serve the ball); 5) chronological analysis of the development of the game in set from 0 to 8 points scored from 9 to 16 points scored from 17 to 25 points scored (in the case of a game situation, more than 25 points scored) 6) analysis of the effectiveness of game actions in different areas of the site: protection zone, zone attacks; zone players (from "1" to "6") 7) analysis of the decisive moments of the game and a general interpretation of the data obtained.

In our opinion, it is the above methodological approaches that open the way for scientists to final determination with the problems of optimal estimation of the level of technical and tactical skill in volleyball.

Conclusions

1. To assess the level of technical and tactical skill of qualified volleyball players, scientists and trainers-practitioners use different methods and techniques, namely: a method of assessing technical and tactical skills in volleyball [6]; a technique for assessing the effectiveness of attacking technical and tactical actions [2]; studying the influence of the psychoemotional state of volleyball players on technical and tactical indicators in competitive activity [5] and others.

2. The general drawbacks of the existing methods for assessing the technical and tactical skill of qualified volleyball players include the lack of an algorithm of analytical procedures and the final disorder of their hierarchical elements. To eliminate these problematic issues, we propose the following algorithm for assessing the indicators of technical and tactical skill in the competitive activity of qualified volleyball players of various roles, namely: analysis and interpretation of the effectiveness of the execution of command (group and individual) schemes of conducting the game in attack, in defense; analysis of the effectiveness of the implementation of standard provisions (ball feeding) analysis of the development of the game in batches; analysis of the effectiveness of gaming activities in different areas of the site; analysis of the decisive moments of the game and a general interpretation of the obtained indicators.

Prospects for further research are based on the need to improve the proposed algorithm, its validation and introduction into the training and competitive activities of qualified volleyball players.

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