

CONTROL OF SPECIAL PHYSICAL TRAINING FOR QUALIFIED FEMALE VOLLEYBALL PLAYERS OF DIFFERENT GAME ROLES**Muntadr Fadel Kadham Hammoondi¹, Olha Shlonska², Olha Borysova³, Yevheniy Imas⁴, Volodymir Gamalii⁵, Viktoriia Nagorna⁶, Yulia Yakusheva⁷**^{1,2,3,4,5,6}University of Ukraine on Physical Education and Sport, Kyiv, (Ukraine)⁷Vinnitsia National Pirogov Medical University, Vinnitsia, (Ukraine)

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Abstract

Modern competitive activity in volleyball makes high demands on the fitness of athletes, where the leading role belongs to technical-tactical and special physical. Control and interconnection of technical-tactical and special physical fitness will ensure to provide the effectiveness of the training system for qualified female volleyball players. The aim of the research is to analyze the manifestation of special physical qualities of qualified female volleyball players of various playing roles and their interconnection with the effectiveness of technical and tactical actions. The study has involved 48 qualified volleyball players (including 6 masters of sports of Ukraine, 20 candidates for masters of sports of Ukraine, 22 female athletes of the first sports category). Close correlations were obtained between the absolute and relative indicators of the use of technical and tactical actions with the special preparedness of qualified female volleyball players: for binders - the results of the test of flexion and extension of the arms in the lying position closely correlates ($r = 0.78$ and 0.84) with the efficiency of the serve; for players of the second temp of attack rate - the results of the shuttle run test (9-3-3-9 m) closely correlate (from $r = 0.77$ to 0.88) with the serve; for the players of the first temp of attack rate, the performance of the test of raising the trunk in the prone position closely correlates ($r = 0.70$ and 0.78) with the effectiveness of the ball pass; libero - the highest correlational connections ($r = 0.92$ and 0.96) are observed when performing the shuttle run test (9-3-3-9 m) and the effectiveness of protective actions. On the basis of the obtained significant correlation coefficients, linear regression models of the relationship between the effectiveness of the application of technical and tactical actions and the results of pedagogical testing were constructed.

Keywords: *preparation, correlation, pedagogical testing***Introduction**

The effectiveness of training system for qualified players in team games and sports, including volleyball, depends on the optimal structure of their training process, which is aimed at solving specific tasks at each stage in the structure of the long-term training system (Platonov 2017; Matveev 2002). Here the important role is played by rational management and application of various control methods of athletes' preparation aspects where the key attention is focused on physical, technical and tactical fitness (Kostiukevych, Borysova, Shynkaruk, Voronova 2019; Hodyk 2010; Kostiukevych, Shchepotina, Shynkaruk, Polishchuk, Shevchuk 2019).

Modern volleyball is characterized by dynamism and high speed of change in game situations, which are performed in conditions of lack of time and space although with active opposition of the competitor. It increases the significance of manifestation level of special physical abilities by athletes, the use of which

in competitive activities affects the effective implementation of technical and tactical actions in game situations. At the same time, there is a tendency to universalize, differentiate and narrowly specialize the game functions of players, which is manifested in modern theory and practice of volleyball by determining their roles: the linker, the player of the first attack rate, the player of the second attack rate, diagonal and libero (Gamalii, Shlonska 2016; Imas, Kogut, Marynych, Kostyukevich, 2017; 2018). However, the structure of competitive activity in volleyball involves players performing different game roles in their competitive actions, which differ in both tactical orientation and performance technique; the latter is systemic in nature and sets certain requirements for the level of technical and tactical and special physical training of qualified athletes.

In the modern scientific and methodological literature, there are some studies that aim to study certain aspects of volleyball players training: general

physical one - emphasis on the development of general physical abilities (Denysovets, Kozak 2015; Hnatchuk, 2007); special physical one - by optimizing the training process based on improving speed and strength abilities (Malikova 2018; Synihovets 2007; Shevchenko 2016; Ummatov 2018), different types of coordination abilities manifestation (Boichuk 2017; Karalić 2016).

Instead, modern competitive activity in volleyball presupposes certain demands on qualified athletes, namely: emotional stability, a wide arsenal of technical and tactical actions, speed of switching from one object to another, game endurance and coordination ability to perform competitive actions, the structure of which is different for players of a certain game role. Only the control and interrelation of technical-tactical and special physical training of female volleyball players performing different game roles will ensure the effectiveness of the training system for qualified female volleyball players. This confirms the relevance and high scientific significance of the chosen area of research.

The aim of the research is to analyze the manifestation of special physical qualities of qualified female volleyball players of various playing roles and their interconnection with the effectiveness of technical and tactical actions.

Methods

Theoretical analysis of special scientific and methodological literature has been conducted in order to determine the relevance of the research topic and determine the main directions for optimization of the training process by controlling various training aspects of qualified female volleyball players.

Pedagogical observation has been conducted in order to determine the structure of technical and tactical actions by qualified female volleyball players on the basis of a video review of their competitive activities. 30 games have been analyzed, as a result of which the scope and efficiency of application of technical and tactical actions by players of different game roles have been determined. Participants. In research participated high-class volleyball players (n=48, including 6 masters of sports of Ukraine, 20 candidates for masters of sports of Ukraine, 22 female athletes of the first category, aged 20-22 years old) of volleyball club "Dobrody-Medical University" and "NUPESU", (major league of the Ukrainian Championship of the season 2020-2021). The results of the analysis of the competitive activity of qualified female volleyball players made it possible to determine the effectiveness of the main technical and tactical actions: serve, pass, attack, block, ball reception, reception of attacking strikes.

To determine manifestation level of special physical abilities of qualified female volleyball players, pedagogical testing has been used:

- Test 1:* shuttle running (9-3-3-9 m);
- Test 2:* shuttle running (9-3-6-3-9-18 m);
- Test 3:* shuttle running (9-3-3-9 m) with falls;
- Test 4:* shuttle running (9-3-6-3-9-18 m) with falls;
- Test 5:* «Herringbone»;
- Test 6:* «Herringbone», with falls;
- Test 7:* squats for 20 s;
- Test 8:* bending and extension of the arms at squat thrusts for 20 s;
- Test 9:* lifting the torso at squat thrusts for 20 s;
- Test 10:* repeated jumps up for 1 min;
- Test 11:* jumping up off the ground (according to the Abalakov's test);
- Test 12:* Jumping up off the running start

Pedagogical testing was carried out at the stage of maximum realization of the individual capabilities of female athletes in the special preparatory period of the first macrocycle of the season 2020-2021.

Methods of mathematical statistics have been used for objective analysis of the studied data; thus, they have ensured their collection, processing, as well as the reliability of the results interpretation. Within the comparative analysis of the competitive activity of qualified female volleyball players, the scope and effectiveness of technical and tactical actions in attack and defense for players of each role have been calculated; when determining the features of special physical abilities manifestation, the arithmetic mean value (\bar{x}), standard quadratic deviation (S), representativeness error (m), coefficient of variation (V) have been calculated. To determine the interrelation between indicators of competitive activity and the level of special physical abilities manifestation according to pedagogical testing, correlation analysis has been used and Pearson's correlation coefficient (r) has been calculated.

Results

Modern trends in the development of volleyball are to increase the speed of organizing an attack, an increase of the number of tactical passes, the organization of a group block, which is an active counteraction against a powerful attack by tall players. Also, the development of competitive activity is characterized by a narrow specialization of the players' game functions, the differentiation of their technical and tactical actions and the universalization of special game actions.

In order to determine the structure of the technical and tactical actions of female volleyball players, the technical and tactical actions of athletes of various playing roles were studied and analyzed, based on the results of their performances at the Ukrainian volleyball championship among female teams of the major league of the 2020-2021 season (Fig. 1). A total of 30 games were analyzed.

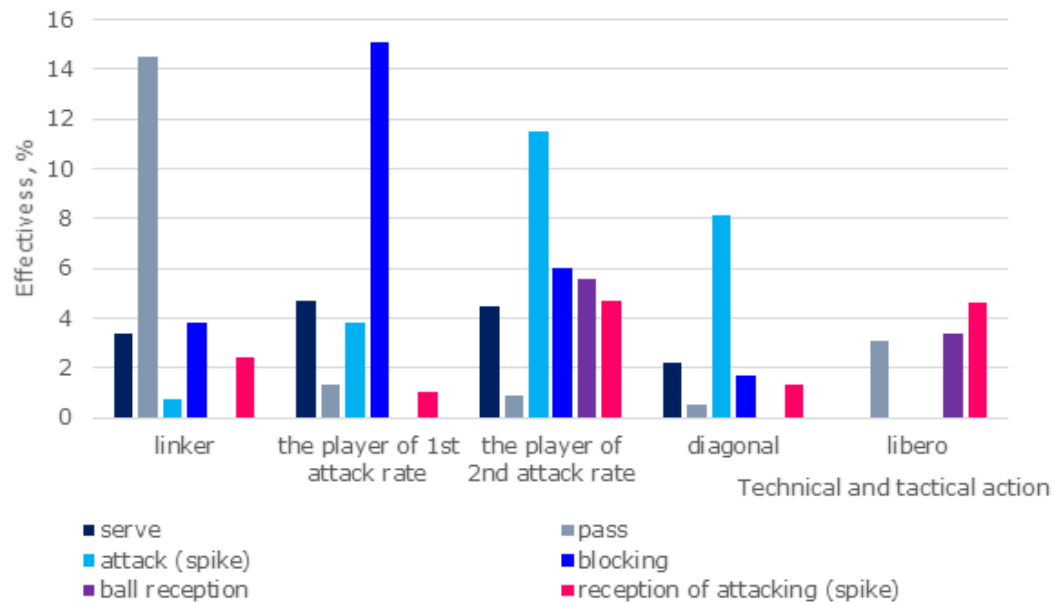


Figure 1. The effectiveness of technical and tactical actions of highly qualified female volleyball players of different game roles

The results of the analysis of the competitive activity of qualified female volleyball players indicate that the leading technical and tactical actions, the effectiveness of which are the highest, are inherent in the athletes of various game roles. Thus, for the linkers players, the greatest contribution to the effectiveness of competitive activity is made by passing the ball with two hands from above (14.5%). The competitive activity of the players of the first attack rate is characterized by the highest blocking efficiency (15.1%). At the same time, there is a significant efficiency in the implementation of attacking strikes (3.8%), which are the basis of all group tactical schemes. The players with the second attack rate have the highest efficiency when performing attacking strikes (11.5%), receiving the ball (5.6%), blocking (6.0%), receiving the attacking strikes (4.7%). For diagonal players, the greatest contribution to the effectiveness of competitive activity is made by the implementation of attacking strikes (8.1%), among liberos - the receiving of attacking strikes (4.6%).

In the process of competitive activity, female volleyball players perform a large number of game actions, which can be different in scope and intensity, the effectiveness of which requires certain level of special physical abilities. In its turn, the effectiveness of technical and tactical actions depends on the development of female athletes' ability to orient in space, quickly make decisions and perform actions in difficult game circumstances, the ability to observe and counteract active attacking actions of the competitor, perform a large number of jumps, rolls and falls while maintaining static balance for further effective competitive activity. Therefore, to assess

the level of special physical abilities development among skilled female volleyball players, in our opinion, we should use pedagogical tests that fully reflect the abilities that affect the effectiveness of technical and tactical actions application in competitive activities and reflect their specificity compared to other team sports.

Thus, pedagogical tests have been distributed according to the manifestation of special physical abilities by qualified female volleyball players: speed and strength abilities – shuttle running (9-3-3-9 m), (9-3-6-3-9-18 m), jump off the ground (according to the Abalakov's test), jumping up off the running start, squats for 20 s, bending and extension of the arms at squat thrusts for 20 s, lifting the torso at squat thrusts for 20 s; speed endurance – «Herringbone», «Herringbone» with falls; jump endurance – repeated jumping for 1 minute; complex manifestation of speed-power and coordination abilities – shuttle running (9-3-3-9 m), (9-3-6-3-9-18 m) with falls.

The analysis of pedagogical testing results (table 1) shows that qualified female volleyball players of various game roles have certain differences in manifestation of their special physical abilities. It is determined that the special physical training of the linkers is implemented in more successful speed and strength performance (7.6 s and 7.9 s) as well as in special coordination abilities (12.0 s and 15.5 s). The players of 1st attack rate are characterized by manifestation of speed and strength abilities at a sufficient level (the result of their jumping exceeds the indicators of representatives of other game roles – 45 and 50 cm), jump endurance (12 jumps at the optimal level) and special endurance (28.0 s). Special

physical training of the players of 2nd attack rate is manifested in better performance of pedagogical tests aimed at speed and strength abilities, where the main advantage is given to performing bending and extending of the arms at squat thrusts for 20 s (15

times) and manifestation of speed endurance according to the «Herringbone» test with falls (28,0 s), which is completed best of all among all game roles representatives.

Table 1. Peculiarities of special physical abilities manifestation by qualified female volleyball players performing different game roles, (n = 48)

Pedagogical Test	Game Role									
	The linker		The player of 1 st attack rate		The player of 2 nd attack rate		Diagonal		Libero	
	X	S	X	S	X	S	X	S	X	S
Shuttle run (9-3-3-9 m), s	7.6	0.1	8.6	0.2	8.7	0.2	9.4	0.2	6.8	0.6
Shuttle run (9-3-3-9 m), with falls, s	7.9	0.2	9.7	0.4	9.1	0.4	9.9	0.2	8.3	0.4
Shuttle run (9-3-6-3-9-18 m), s	12	0.4	12.4	0.2	12.7	0.2	13.6	0.3	11.2	0.2
Shuttle run (9-3-6-3-9-18 m) with falls, s	15.5	0.5	16.9	0.8	17	0.2	19.8	0.8	14.3	0.4
«Herringbone», s	23.1	0.2	24.8	0.4	25	0.3	26	0.5	23.2	0.2
«Herringbone» with falls, s	28.3	0.6	28	0.2	28	0.3	33.8	1	28.8	0.6
Squats for 20 s, quantity of times	21	0.8	18	0.6	17	0.8	15	1.3	32	1.3
Bending and extension of the arms at squat thrusts for 20 s, quantity of times	16	0.5	14	0.4	15	0.3	13	0.4	15	0.8
Lifting the torso at squat thrusts for 20 s, quantity of times	18	0.4	14	0.8	18	0.6	13	0.6	16	1.3
Repeated jumps up for 1 min, quantity of times	5	0.8	12	0.3	10	0.6	8	0.4	8	0.4
Jumping up off the ground (according to the Abalakov's test);	41	0.2	45	0.6	44	0.7	47	0.7	49	2.5
Jump off the running start, cm	47	0.3	50	0.6	54	0.5	49	0.4	55	2.1

Libero players show a high level of complex coordination and speed abilities realization when performing shuttle run (9-3-6-3-9-18 m) test and during the fall, speed and strength abilities, especially when bending and unbending the arms at rest for 20 s (15 times), speed endurance when performing the «Herringbone» test (23.2 s). Diagonal players have the worst results of their special physical abilities testing and require the introduction of specialized comprehensive programs to improve their physical training.

The competitive activity of qualified female volleyball players of different game roles is filled with the use of technical and tactical actions, which are different in scope and intensity during a game. Rational choice of the necessary competitive actions in a particular game situation can provide the optimal level of female athletes' special physical abilities development. Therefore, the solution to this problem is possible only by determining the relationship of special physical training with the results of competitive activities.

Tables 2 and 3 present the correlation between the indicators of special physical training and competitive activity of qualified female volleyball players on the example of game roles (the player of 1st attack and of 2nd attack rate).

Table 2. Correlation between the indicators of special physical training and competitive activity of qualified female volleyball players (role – the player of 1st attack rate)

Indicators of technical and tactical actions		Pedagogical Tests				
		Shuttle running (9-3-3-9 m)	Shuttle running (9-3-6-3-9-18 m) with falls	Squats for 20 s	Lifting the torso at squat thrusts for 20 s	Repeated jumps up for 1 min
Serve	1	0.777*	0.354	-0.566	0.806*	0.244
	2	0.757*	0.135	-0.568	0.798*	0.324
	3	0.857*	0.354	0.678*	0.797*	0.286
	4	0.885*	0.111	-0.464	0.756*	0.486
Pass	1	0.171	0.667*	-0.121	-0.234	-0.277
	2	0.194	0.567	-0.222	-0.181	0.058
	3	0.786*	0.657*	0.211	0.377	-0.387
	4	0.689*	0.834*	0.124	0.322	0.276
Blocking	1	-0.171	0.768*	-0.091	0.224	0.756*
	2	0.057	0.812*	-0.218	0.121	0.765*
	3	-0.086	0.754*	0.074	0.014	0.723*
	4	0.209	0.757*	-0.164	-0.167	0.789*
Reception of attacking strikes	1	0.587	-0.234	0.709*	-0.556	0.144
	2	0.274	-0.346	0.608*	-0.389	0.222
	3	0.267	-0.213	0.657*	-0.299	0.355
	4	0.244	-0.268	-0.617	-0.264	0.285

Note: 1 – the number of performed technical and tactical actions; 2 – the number of technical and tactical actions; 3 – the number of winning technical and tactical actions; 4 – the effectiveness of technical and tactical actions; * - reliable ($p < 0,05$) correlation coefficients.

Analysis of the correlation matrix shows that the players of 1st attack rate (table 2) have direct close relations on all indicators of competitive activity ($r = 0.77$; 0.75 ; 0.85 and 0.88) when performing shuttle run (9-3-3-9 m) test with the use of different types of ball serve. This is a manifestation of the speed and strength abilities of the players when performing individual technical and tactical actions and lifting the torso at squat thrusts for 20 s. Also, the results of this test significantly affect the number of successful passes and their efficiency ($r = 0.70$ and 0.78). This is due to the fact that it is the player of 1st attack rate who can perform the second pass provided that the linker participates in defensive actions. With a high degree of validity ($p < 0.05$) there is interrelation (from $r = 0.61$ to 0.70) between the implementation of the pedagogical test of squats for 20 s and the registered indicators of competitive activity, the scope and effectiveness of attacking passes. A test that aims at jump endurance closely correlates (from $r = 0.70$ to 0.78) with the performance of blocking in competitive conditions.

Table 3. Correlation between the indicators of special physical training and competitive activity of qualified female volleyball players (role – the player of 2nd attack rate)

Indicators of technical and tactical actions		Pedagogical Tests				
		Shuttle running (9-3-3-9 m)	Shuttle running (9-3-6-3-9-18 m) with falls	Squats for 20 s	Lifting the torso at squat thrusts for 20 s	Repeated jumps up for 1 min
Serve	1	0.777*	0.354	-0.566	0.806*	0.244
	2	0.757*	0.135	-0.568	0.798*	0.324
	3	0.857*	0.354	0.678*	0.797*	0.286
	4	0.885*	0.111	-0.464	0.756*	0.486
Pass	1	0.171	0.667*	-0.121	-0.234	-0.277
	2	0.194	0.567	-0.222	-0.181	0.058
	3	0.786*	0.657*	0.211	0.377	-0.387
	4	0.689*	0.834*	0.124	0.322	0.276
Blocking	1	-0.171	0.768*	-0.091	0.224	0.756*
	2	0.057	0.812*	-0.218	0.121	0.765*
	3	-0.086	0.754*	0.074	0.014	0.723*
	4	0.209	0.757*	-0.164	-0.167	0.789*
Reception of attacking strikes	1	0.587	-0.234	0.709*	-0.556	0.144
	2	0.274	-0.346	0.608*	-0.389	0.222
	3	0.267	-0.213	0.657*	-0.299	0.355
	4	0.244	-0.268	-0.617	-0.264	0.285

Note: 1 – the number of performed technical and tactical actions; 2 – the number of technical and tactical actions; 3 – the number of winning technical and tactical actions; 4 – the effectiveness of technical and tactical actions; * - reliable (p <0,05) correlation coefficients.

The players of 2nd attack (table 3) rate have a close correlation (from r = 0.77 to 0.88) according to all indicators of competitive activity, when performing the ball serve, with the results of shuttle run (9-3-3-9 m) test. There is also a fairly high correlation between this test with the number of successful ball passes and their efficiency. This is especially true for those passes, performed from the depth of the court to the line of attack. The pedagogical test of shuttle running (9-3-6-3-9-18 m) during the fall has direct correlations (r = 0.66 and 0.65) with the scope and efficiency of the second ball pass. With a high degree of reliability (p <0.05) there is also a relationship (r = from 0.76 to 0.83) of this test with all indicators of competitive activity when performing different types of blocking in difficult game circumstances, where players are required to show coordination and speed-strength abilities.

The result of the pedagogical squat test for 20 s has a direct close relationship (r = 0.70, 0.63, 0.65 and 0.61) with the indicators of competitive activity in the performance of defensive actions (actually the reception of attacking blows). This is possible due to the fact that for effective play in defense, there

should be a prerequisite for the players of 2nd attack rate; it is a special strength of their thigh muscles of flexor and extensor types, which is followed by a significant number of movements when switching from attacking to defensive actions in competitive activities. The test, which aims to determine the level of endurance, has a close relationship with the use of serve (which has recently been performed in the jump) (r = 0.75 and 0.78) and the use of different types of locks (r = 0.80 and 0.84) and attack (spike) (r = 0.74 and 0.72).

The linker players show a significant increase in the close correlations between the results of special physical abilities manifestation and the indicators of competitive activity in comparison with other game roles representatives. First of all, this is possible due to the high degree of intensity of their competitive activities, the essence of which is involvement in almost all technical and tactical actions (except for the serve). Close inverse correlation is observed when performing shuttle run (9-3-6-3-9-18 m) test with quantitative indicators and scope and blocking efficiency (r = 0.77 and 0.78) as well as defensive actions (r = from 0.77 to 0.91). A direct close

relationship has been found between the performance of the torso lifting test at squat thrusts for 20 s with the number of passes completed and their effectiveness ($r = 0.769$ and 0.755). The test results of bending and extension of the arms at squat thrusts for 20 s significantly affect the quantitative and percentage performance of the ball serve ($r = 0.78$ and 0.84); as well as the volume and effectiveness of defensive actions ($r = 0.81$ and 0.74). Jumping up off the ground with a high degree of reliability ($p < 0.05$) significantly affects the efficiency of the pass ($r = 0.71$ and 0.62) and blocking ($r = 0.75$ and 0.85).

The competitive structure of libero players in volleyball is characterized to a greater extent by the performance of defensive actions and passes, which leads to a much wider range of pedagogical tests, closely correlated with the competitive activities of qualified female volleyball players. Performance of shuttle run (9-3-3-9 m) test with a high degree of reliability ($p < 0.05$) is inversely correlated with the number and scope of ball serves ($r = 0.91$ and 0.95); shuttle test (9-3-6-3-9-18 m) according to all indicators and criteria of efficiency of serving the ball ($r = 0.98$; 0.91 ; 0.86 and 0.92); «Herringbone» test ($r = 0.88$ and 0.93); «Herringbone» test with falls, which gives the manifestation of speed endurance – in quantitative terms and efficiency of ball serve ($r = 0.86$ and 0.89) and the results of competitive activities in the performance and effectiveness of defensive actions ($r = 0.84$). 0.82 and 0.87); test of

lifting the torso at squat thrusts on the number of ball serves and its effectiveness ($r = 0.78$ and 0.77).

Diagonal players have the largest number of close correlations with a high degree of reliability ($p < 0.05$) when performing shuttle run (9-3-6-3-9-18 m) test according to the number of performed second passes and their efficiency ($r = 0.86$ and 0.94). When performing the «Herringbone» test, the closest relationships are observed when performing effective defensive actions ($r = 0.91$); when performing the test of lifting the torso at squat thrusts for 20 s – a close relationship has been found with the number of second pass and its scope ($r = 0.72$ and 0.87) and the performance of successful defensive actions ($r = 0.93$ and 0.82); when performing a test aimed at the manifestation of jumping endurance, it was determined that there is a close relationship between multiple jumps with the number of performing attacking strikes and their winnings ($r = 0.84$ and 0.79).

The obtained results of correlation analysis regarding qualified female volleyball players allow determining the direction of influences for each role, establishing the optimal levels of special physical abilities development, as well as outlining the relationship between their manifestation and effectiveness of technical and tactical actions. Thus, on the basis of the obtained reliable correlation coefficients, linear models have been constructed between the efficiency of competitive qualification indicators and tests for players of individual roles (Table 4).

Table 4. Mathematical correlation models of technical and tactical actions application efficiency and results of pedagogical testing among qualified female volleyball players of different game roles

Role of female volleyball player	Linear regression equations	Reliable significance of the model
The linker	$Y_1 = -4.88 + 0.19X_{16}$ $Y_1 = -4.57 + 0.16X_{18}$ $Y_4 = -9.49 - 0.72X_8$ $Y_6 = 31.89 - 2.45X_8$	$P < 0.95$
The player of 2nd attack rate	$Y_1 = 9.6 - 0.28X_{15}$ $Y_2 = 2.55 - 0.12X_9$ $Y_4 = 3.45 - 0.16X_9$	$P < 0.95$
Diagonal	$Y_2 = 84.84 - 643X_8$ $Y_3 = 15.57 - 1.15X_8$ $Y_6 = 7.73 - 0.27X_{10}$	$P < 0.95$
Central blocking	$Y_2 = 4.87 - 0.25X_9$ $Y_6 = 14.61 - 1.08X_8$	$P < 0.95$
Libero	$Y_5 = -2.97 + 0.1X_{14}$ $Y_5 = -3.54 + 0.14X_{19}$	$P < 0.95$

Note: Y_1 – Serve efficiency, %; Y_2 – Pass efficiency, %; Y_3 – Effectiveness of the attacking blow, %; The results of regression analysis establish the following characteristics for the linkers; Y_4 – Efficiency of blocking, %; Y_5 – Efficiency of serve reception %; Y_6 – Efficiency of attacking blows reception, %; X_8 – shuttle run (9-3-6-3-9-18 m), s; X_9 – shuttle run (9-3-6-3-9-18 m) in fall, s; X_{10} – "Herringbone", with; X_{15} – lifting the torso at squat thrusts for 20 s, a number of times; X_{16} – bending and extension of the arms at squat thrusts for 20 s, a number of times; X_{18} – high jump off the ground, cm; X_{19} – high jump off the running start, cm.

The results of regression analysis establish the following characteristics for the linkers:

- the test of lifting the torso at squat thrusts for 20 s is carried out 1 time more, this increases the average serve efficiency by 0.19%;
- the high jump off the ground test is performed 1 cm higher, which increases the average serve efficiency (%) by 0.16%;
- shuttle run (9-3-6-3-9-18 m) test is performed for 1 s longer, it reduces the average blocking efficiency by 0.72% and the effectiveness of attacking strikes by 2.45%;
- The results of regression analysis establish the following characteristics for the players of 2nd attack rate, namely:
 - the test of lifting the torso at squat thrusts for 20 s is carried out 1 time more, it increases the average efficiency of the player's role by 0.28%;
 - the shuttle run test (9-3-6-3-9-18 m) in the fall is performed for 1 s longer, which reduces the average transmission efficiency by 0.12%. and blocking efficiency by 0.16%.
- The results of regression analysis establish the following characteristics for diagonal players:
 - shuttle run (9-3-6-3-9-18 m) test is performed for 1 s longer, it reduces the average pass efficiency by 6.48% and the effectiveness of attacking blow by 1.15%;
 - the "Herringbone" test is performed for 1 s longer, which reduces the average efficiency of attacking strikes by 0.27%.
- The results of regression analysis establish the following characteristics for central blocking players:
 - shuttle run (9-3-3-9 m) test is performed for 1 s longer, it reduces the average serve efficiency by 0.92% and taking defensive actions by 0.59%;
 - the high jump off the running start test is carried out 1 cm higher, which increases the average serve efficiency by 0.15%.
- shuttle run (9-3-6-3-9-18 m) test in fall is performed for 1 s longer, which reduces the average efficiency of the ball pass by 0.25% and the effectiveness of attacking strikes by 1,08%.
- The results of regression analysis establish the following characteristics for libero players:
 - the test of lifting the torso at squat thrusts for 20 s is carried out 1 time more, it increases the average efficiency of receiving the ball by 0.1%;

- the high jump off the running start test is carried out 1 cm higher, it increases the average serve efficiency by 0.14%.

Discussion

The results of the study have showed that the manifestation level of special physical abilities of qualified female volleyball players significantly affects the effectiveness of their technical and tactical actions. The structure of competitive activity of athletes, performing different game roles has certain differences, which is evident in the development of special physical abilities (Synihovets 2007; Hnatchuk 2007), the application of control for various training aspects (Mitova 2019) and management of training and competitive activities (Kostiukevych 2019).

According to the results of pedagogical testing and determination of the relationship between technical-tactical and special physical training of qualified volleyball players of different game roles, the leading physical abilities have been determined. Thus, for the linkers, the main tactics of competitive activity is the application of speed and strength, which is determined by the efficiency of the ball pass and defensive actions, where the dominant manifestation is the complex implementation of coordination abilities. The structure of competitive activity of the players of 2nd attack rate is filled with a large number of attacking blows, which are performed during the game from non-standard starting positions and a significant number of defensive actions, the effectiveness of which depends on the speed of switching from attacking to defensive actions. Therefore, the application of speed-strength and coordination abilities significantly affects the effectiveness of their technical and tactical actions. In their structure of competitive activity players of 1st attack rate perform work of speed and strength, which is manifested in the performance of a significant number of jumps and the use of attacking blows, which differ from other attacking players due to low trajectory and speed. During one game, they perform a significant number of blocks, which requires them to show high speed and jump endurance. Taking into account current trends in volleyball, diagonal players mostly perform attacking actions using group tactics of attack and attacking blows from the back line of the playing field (Gamalii, Shlonska 2016, Strelnykova 2016, Yakusheva 2021). Thus, the leading special physical ability for them is speed-strength and jump endurance. The competitive activity of libero players differs significantly from the athletes of other game roles due to the fact that they perform only defensive actions and a small number of attacking actions (passing the ball in cases where the linker is not able to perform this technical tactical action). Therefore, libero players must have a high level of speed and strength abilities, a comprehensive use of

coordination skills and special endurance that will ensure the effective implementation of their technical and tactical actions.

Based on the obtained experimental data in the development of regression models on the relationship between the effectiveness of technical and tactical actions and the development of special physical abilities it is possible to adjust the training process of qualified female volleyball players, aimed at individualizing the training for athletes of different roles.

Conclusions

1. Analysis of modern special scientific and methodological literature shows that improving efficiency of technical and tactical actions of qualified female volleyball players requires a high level of special physical abilities.
2. The results of pedagogical testing prove that the level of development of the most significant special physical abilities for qualified female volleyball players of different game roles depends on the peculiarities of their competitive activities, taking into account the intensity and scope of technical and tactical actions in attack and defense.

3. Correlation relations between absolute and relative indicators of technical and tactical actions application with special physical abilities of qualified female volleyball players are determined. For the linkers, there are close correlations between the serve efficiency and the performance of bending and extension test of the arms at squat thrusts for 20 s; for the players of 2nd attack rate – lifting the torso at squat thrusts for 20 s; for diagonal players – performance of shuttle run (9-3-6-3-9-18 m) test by the number of performed and efficiency of the second passes, the number of applied attacking blows and their efficiency; for central blockers – for all indicators of competitive activity there are direct close correlations with the results of shuttle run shuttle run (9-3-3-9 m) test; for libero players – the results shuttle run (9-3-3-9 m) test with a high degree of reliability are inversely correlated with the number and scope of the ball reception.

4. Based on correlation analysis, we have built linear regression models of the relationship between the effectiveness of technical and tactical actions and the results of pedagogical testing of qualified female volleyball players of different roles, which prove the relationship between the results of pedagogical tests and the specifics of competitive activities.

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