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EFFECTIVENESS OF PHYSICAL TRAINING OF TENNIS PLAYERS FOR COMPETITIONS USING ELEMENTS OF ATHLETICS

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Purpose: determination of the effectiveness of physical training of tennis players for competitions using elements of athletics exercises.

Material and methods: analysis of scientific and methodological sources; observation; measurements and accounting; instrumental techniques; statistical and mathematical. The test group consisted of 10 young tennis players at the age of 9-12 years old, who were practicing on the basis of one tennis club and had an experience of regular tennis lessons (at least three trainings per week) from 1 year.

Results: the main feature of the period of participation in tournaments is the need to maintain a specific level of special performance. Therefore, the specificity of physical training has an applied functional nature to high-level loads. Its purpose is to ensure maximum special fitness and maintain its level, as well as to maintain general fitness. Based on the results of the ascertaining experiment, methodological complexes have been developed for use in physical training of young tennis players during the period of participation in competitions. The effectiveness of their application has been determined. The developed complexes

of exercises were effective for ensuring the development of speed and speed-strength abilities of the tennis players of the test group. However, their effectiveness was not significant for increasing the pace of strikes, as well as increasing the strength of the legs and shoulder girdle.

Conclusions: the adaptation of the methodology of physical training of young tennis players involves considering both the peculiarities of physical fitness in relation to the effectiveness in competitions, and its influence on the process of technical and tactical improvement of the players. The obtained data partly testify in favor of the use of the developed methodological complexes for the physical training of young players during the competition. Thus, the presented complexes are promising for use in the process of physical training of tennis players during participation in competitions, however, they require more thorough testing.

Keywords: young tennis players, physical and technical training, target accuracy.

Introduction

Training of young tennis players involves regular participation in matches of various levels [4]. The percentage of competitive practice in tennis is constantly increasing, which affects the change in the structure of training activities of young tennis players. However, the body of young players is not yet adapted to long intense games and is in the process of active biological development [5]. Therefore, there is a decrease in time for different types of training. As a result, there may be a situation where the technical skills, the results of the games have little or no negative dynamics due to insufficient time spent on physical training. This is especially true during the period of preparation and participation in competitions. Therefore, there is a need to develop the issue of physical training of young tennis players in preparation for competitions.

Analysis of recent research and publications. There is no doubt that there is a relationship between sports equipment in tennis and the physical training of the player. Moreover, it is believed that the appropriate level of physical fitness is the

basis for the formation of a rational complementary and affect each other [9]. This combination acquires the greatest importance during the periods of preparation and participation in competitions.

The essence of competitive activity is the manifestation of personality traits, in a complex of motor skills acquired in the process of preparation and participation in games [8, 12]. It is worth noting that from the age of twelve young tennis players begin to actively participate in official tournaments, the number of which increases from year to year, while their age characteristics are characterized by rapid physical development [10, 11]. However, some authors note that indicators of the level of speed and strength abilities, as well as speed endurance can be used as an assessment of compliance with the criteria of competitiveness [1, 2]. Of course, when planning physical training in the period of training and participation in competitions of young players should consider a set of specific personal, psychophysiological abilities and sports fitness.

When developing a set of physical training exercises for young tennis players should be guided by the peculiarities of the game motor actions performed by players. At the same time, leading experts already at the initial stages of training of young athletes recommend focusing on the features of the technique of adult tennis players [6, 7, 12]. To play successfully, a tennis player must have such abilities as starting speed, reaction speed, speed endurance, speed, explosive power, strength endurance, feeling the ball, etc.

The tennis player's game activities involve the involvement of all major muscle groups in the body. The leading role in these actions is played by the high-speed dynamic efforts caused by high speed of movements. However, during strikes, high static forces are essential, so the strength training of a tennis player should be versatile and develop muscle strength in different modes of operation. Modern tennis players perform a significant number of strokes in the unsupported position [10]. Therefore, to stabilize the stability and control of movements during repulsion are necessary: exercises that develop the strength of the muscles of the torso and shoulder girdle, exercises that stabilize the position of the body at the

time of impact; exercises for rigid fixation of the body (in the process of moving the body on the ball contribute to better work of the arm muscles and maintaining stability); special exercises to repay the recoil forces on impact (help increase the stability of children).

Studies have shown that in the training of tennis players more attention should be focused on educating the ability to quickly increase running speed, the frequency of steps when running the ball in game situations, as well as the ability to reach maximum speed in the first 2-3 seconds when performing starting jerks [1]. In tennis, the following elementary forms of manifestation of speed are important: speed of motor reaction; speed of unloaded movement (single); frequency of movements. An example of the manifestation of the speed of motor reaction is the actions of a tennis player when receiving the opponent's serve or when playing on the fly near the net. The speed of unloaded movement is manifested, for example, in a sharp turn of the shoulders in the impact. The frequency of unloaded movements is manifested in the characteristic small "step" of a tennis player when approaching a ball that is flying close (before the last wide step). In many other cases, these elementary forms of speed are manifested along with other physical qualities. Yes, fast acceleration of a tennis player to the ball is possible only due to the high speed strength of the leg muscles and coordination of movements, and its performance against the background of fatigue requires good anaerobic endurance.

According to the presented features of motor activity of tennis players it is necessary to form the program of physical training. Therefore, **the purpose of the work** is to determine the effectiveness of physical training of tennis players for competitions using various elements of motor actions. According to her, **the hypothesis of the study** was that the relationship between physical and technical fitness of young tennis players allows during the period of participation in competitions effectively to learn the parameters of the technical elements of the game of young athletes through the use of physical training exercises.

Material and Methods of research

Objects. The test group consisted of 10 young tennis players aged 9-12, who played on the basis of one tennis club and had experience of regular tennis lessons (at least three training sessions per week) from 1 year.

Research program. In the process of ascertaining experiment, the current level of physical and technical fitness of young tennis players was determined a week before the start of the tournaments. In the process of formative experiment, the effectiveness of the developed set of physical training exercises was determined, which was used directly during the participation of young tennis players in tennis tournaments, which had a training (simulation) character and were held on the club and with representatives of other clubs.

Testing. To determine the level of physical and technical fitness of the participants, tests were selected that characterize the level of special qualities of tennis players. The test session was held for two days at the beginning of training sessions according to the coach's schedule after two days of rest. Tennis players were advised not to eat two hours before testing. Before testing, participants performed a warm-up for 5-10 minutes (light jogging, side shifts, dynamic stretching and jumping) at the level of heart rate = 100-130 beats/min.

Selected test exercises: long jump from a place (m); triple jump from a place (m); running from a high start at 18 m (s); «American fan» – 3 points (c); bending of arms in an emphasis lying down (times); throwing a stuffed ball (1 kg) from behind the head with one hand.

Intervention. After analyzing the results of the observational experiment, a range of exercises was identified that would help maintain competitiveness and develop the physical abilities of young tennis players during participation in tournaments (only 2 weeks). From the selected exercises, which are elements of athletic exercises or preparatory exercises from the arsenal of athletics, performed in a manner consistent with the characteristics of motor activity of tennis players, were formed methodological complexes for physical training of tennis players

during competitions with a predominant focus on speed (Complex 1) and complex strength abilities (Complex 2):

Complex 1

1. Jumping rope on two legs. Dosage: 3 x 25 s (rest 10 s). Methodical instructions: maximum speed of execution.

2. Jumping rope on one leg for. Dosage: 3 x 20 s on one leg and then 20 s on the other leg for 20 s. (rest 15 seconds after the end of the cycle for both legs). Methodical instructions: maximum speed of execution.

3. Cross steps. Dosage: 2 x 20 m with cuff loading on the distal ends of the lower extremities (0,2 kg), then 2 x 20 m without cuffs (rest between approaches 10 s) Methodical instructions: maximum intensity of execution.

4. Running with a high rise of the thigh. Dosage: 2 x 10 m with cuff loading on the distal ends of the lower extremities (0,2 kg), then 2 x 10 m without cuffs (rest between approaches 10 s) Methodical instructions: maximum intensity with a small advance.

5. Running with fast changes of direction. Dosage: 1 time with cuff loading on the distal ends of the lower extremities (0.2 kg), then 1 time without cuffs (rest between approaches for 25 seconds) Guidelines: 5 control points located on different court lines, after reaching each return to starting position.

The complex was used two days before the series of games.

Complex 2

Method of execution: in a circle. Dosage: each exercise was performed for 15 s (rest between exercises – 45 s; between circles - 3-5 min); in total – 3 circles. Exercises:

Jumping on a hill (25 cm) on the right / left leg.

Imitation of a blow on the right / left with a dumbbell (0.5-1 kg) or a weighted racket.

Jumping «frog».

From the starting position - lying on your back at the same time raise your legs and torso. Jumps to the side with the imitation of blows to the right and left of the fly.

Imitation of a blow over the head from a position in which the arm with a dumbbell (0,5-1 kg) or a weighted racket is lowered behind the back

From the starting position - lying on your stomach, arms outstretched, bend, while taking the legs and torso back.

Flexion and extension of the arms at rest lying on the floor.

From the starting position, lying on your back, arms with a stuffed ball (1 kg) stretched forward, raise and lower your arms.

The complex was applied a day after the end of a series of games.

Tools. The rate of tennis strokes in the draw was determined automatically using the device Babolat POP (2018) [3, 6]. The results recorded by the device were analyzed using the Babolat POP application (2019), which was installed on the iPad Air 3 tablet (2019). The device was paired with a tablet computer after testing via the Bluetooth 5 wireless system (2019). To control the pace, shots to the right of the rebound during the two-sided draw were chosen [7].

Statistics. Statistical analysis was performed using Statistica 15 (2019) software for Windows. Statistically significant was considered $p<0,05$. *Descriptive statistics: mean*, standard deviation. The normality of the distribution of test results was determined by calculating the Kolmogorov-Smirnov criterion. The results obtained for all tests did not comply with the law of normal distribution, so the non-parametric criterion Sing test (comparing two dependent samples; one group) was used to compare the experimental characteristics, and Spearman rank Correlation was used to determine correlations. the p-level of significance for all test scores was 0,05.

Results of the research

The object of the study was the personal achievements of young tennis players in test exercises, which reflect a number of physical and tactical qualities

necessary for a successful game of tennis. The results of the study are contained in Table 1.

Table 1

The results of monitoring the training of young tennis players (n = 10)

Test	Control ($\bar{X} \pm \sigma$)		Z (p)
	Inc.	Out.	
18 m running (s)	4,00±0,22	3,94±0,20	2,04 (<0,04)*
«American Fan» 3 points (s)	9,81±0,51	9,73±0,47	2,47 (<0,01)*
Throwing a medicine ball (1 kg) (m)	12,24±1,72	13,15±2,11	2,04 (<0,04)*
Long jump (m)	1,47±0,10	1,55±0,10	1,77 (>0,05)
Triple jump (m)	5,38±0,24	5,50±0,16	2,04 (<0,04)*
Push-ups (sum)	28,14±5,43	29,50±4,06	1,77 (>0,05)
Pace (beats / min)	18,70±1,64	19,40±1,17	1,50 (>0,05)

Explanation: * - the results differ significantly at the level of <0.05

Table 2 presents the results of correlation analysis, which included indicators obtained during the observational experiment.

Table 2

Relationship between young tennis players' training indicators (n = 10)

№	Test	1	2	3	4	5	6	7
1	18 m running (s)	**1**	0,83*	0,40	-0,04	0,87*	0,60	-0,78*
2	«American Fan» 3 points (s)	0,83*	**1**	0,75*	-0,09	0,92*	0,72*	-0,73*
3	Throwing a medicine ball (1 kg) (m)	0,40	0,75*	**1**	0,07	0,54	0,60	0,54
4	Long jump (m)	-0,04	-0,09	0,07	**1**	-0,16	-0,37	-0,13
5	Triple jump (m)	0,87*	0,92*	0,54	-0,16	**1**	0,66*	0,55
6	Push-ups (sum)	0,60	0,72*	0,60	-0,37	0,66*	**1**	0,70*
7	Pace (beats / min)	-0,78*	-0,73*	0,54	-0,13	0,55	0,70*	**1**

Explanation: * – significant correlation

Conclusions / Discussion

The analysis of the obtained results allowed to state that in the test "American Fan" the indicators of the athletes of the test group are closely correlated with the indicators of complex manifestation of strength training (throwing a stuffed ball, triple jump, bending and unbending the arms while lying

down), speed (running 18 m) and special abilities (rate of blows). Therefore, strength training exercises for young tennis players in the competitive period should include running exercises (various jerks) and jumping exercises, which in the conditions of the appropriate level of development of technical and tactical skills will help to improve the percussion technique. The rate of strokes also had a significant correlation with the strength of the shoulder girdle, which indicates the need to use the extension of the arm extension in the supine position for physical training in the competitive period of young players.

Of all the test exercises, only the results of the long jump did not have significant correlations. Obviously, this test is not informative to characterize the physical fitness of a group of young tennis players who participated in the study.

The recorded relationships have determined the direction of the choice of exercises for training young tennis players during the competition, in order to form methodological complexes aimed at improving their physical fitness.

The "high start" run test reflects the ability of young players to produce the maximum speed of movement from a place, which is an imitation of a jerk to the ball to perform a blow. The results of this test significantly increased at the end of the study (Table 1).

Speed endurance when moving to different play areas is determined by the type of shuttle run "American 3-point fan". The results of this test significantly increased at the end of the study.

The tests of "throwing a stuffed ball", "bending the arms at a stop", "jumping from a place" and "triple jump" reflect a complex manifestation of the strength abilities of young tennis players, which determines the quality of performance and some other technical elements. Only the results of the triple jump and throwing the stuffed ball significantly improved at the end of the study.

The pace of the blows is a complex characteristic of the sports readiness of young tennis players for intense playing activities. The results of the rate measurement did not change significantly during the study.

Adaptation of methods of physical training of young tennis players involves considering both the peculiarities of physical fitness in relation to performance in competitions, and its impact on the process of technical and tactical improvement of players. The obtained data partially testify in favor of application of the developed methodical complexes for physical training of young players during competitions. Requires a more detailed study of the selection of test exercises to assess young tennis players during participation in competitions. The application of the developed complexes only partially affected the dynamics of the strength abilities of the legs and shoulder girdle. The rate of blows also did not change significantly, but the complexes did not contain specific exercises to improve it. Thus, the presented sets of exercises with the use of elements of athletics are promising for use for physical training of tennis players during participation in competitions, but require more thorough testing.

Prospects for further exploration. Further research will be aimed at creating other options for methodological sets of exercises using elements of athletics for the physical training of young tennis players, in order to implement them in the pre-competition period and during competitive periods of varying duration.

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