Dynamics of physical fitness indicators of girls aged 6-14 participated in tennis and their qualitative assessment

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Abstract

Objective of the study was to determine the magnitude of changes in the indicators of physical qualities in female tennis players aged 6-14 years.

Methods and structure of the study. To assess the physical fitness of tennis players aged 6-14, training at the stage of initial training and the training stage, it was proposed to perform 18 tests, on the basis of which 21 indicators were calculated. A total of 228 girls aged 6-14 who go in for tennis at sports schools in Moscow and the Moscow region, as well as private academies and clubs, were examined.

Results and conclusions. Achievements demonstrated by tennis players at 14 years old are better than at 6 years old. However, in some tests, the best results were recorded in tennis players under 14 years old. The scatter in the values of the increase in results in different tests is large and ranges from 1.48% to 345.03%. The magnitude of the increase in the result in a test that evaluates physical quality largely indicates the degree of trainability of the quality.

It has been established that in tests evaluating the same physical quality, there is a large scatter in the values of the increase in results, which indicates a different degree of trainability of manifestations of the same quality.

Keywords: *physical qualities, physical fitness, female tennis players aged 6-14, dynamics of results, growth rate, trainability.*

Introduction. The specificity of competitive activity underlies the preparation of athletes and physical training, in particular. It is the competitive activity that requires the appropriate structure of the physical fitness of athletes, as well as knowledge of the priority of physical qualities required in each specific sport [4]. Studies of the factor structure of the physical fitness of tennis players with a high level of mastery of men and women, as well as the priority of physical qualities to achieve success in tennis, were carried out by the employees of the Federal Science Center of Physical Culture and Sport (VNIIFK) [6, 7].

The question arises of how physical qualities change at the first stages of a long-term training process, that is, at the stages of initial training and training, as well as the question of what physical qualities coaches should focus on during the initial selection.

Objective of the study was to determine the magnitude of changes in the indicators of physical qualities in female tennis players aged 6-14 years.

Methods and structure of the study. To assess the physical fitness of tennis players aged 6-14, training at the stage of initial training and the training stage, it was proposed to perform 18 tests, on the basis of which 21 indicators were calculated. Similar tests are used when examining members of the country's national tennis team of different ages, regardless of gender differences [6–8].

Means and methods of tennis players' physical readiness control are developed on the basis of competitive activity requirements [6, 8].

Table 1. *Age of the best results in tests assessing various physical qualities*

Physical qualities	Test	Result in 6 years	Best result	The largest increase in the result, %	Age of achievement of the best result, years
Speed abilities	- 5 m run, s;	1,52	1,23	19,1	13
	- 10 m run, s;	2,71	2,01	25,8	14
	- speed of reaction, s	0,73	0,51	30,2	8
Force abilities	- dynamometer compression, kg				
	hand holding a racket	9,43	25,66	172,1	14
	helping hand;	8,55	24,24	183,5	14
	- long jump from the place, cm;	123,5	194,05	57,2	14
	- jumping up, cm;	16,56	28,68	73,2	13
	- throwing stuffed ball, weighing 1 kg, m	8,74	14,65	86,4	14
Coordinating ability	- stepping over a stick, quantitatively;	12,45	22,48	80,5	11
	- 6 jumps, 5 of which need to be done a little further than the previous one, cm;	17,12	4,62	73,01	13
	- hitting the ball with the edge of the racket, quantity;	5,85	22,90	291,5	14
	- jumping up with a swing of the hands / jumping up the arms on the belt, in%	116,68	120,55	3,3	7
Endurance	- «shuttle» 6x8 m, s;	15,57	13,84	20,0	13
	- the sum of 10 jumps up, cm;	136,17	295,57	117,1	13
	- repulsion time when performing 10 jumps up, s	0,57	0,47	19	8
Flexibility	- downward slope, cm;	2,57	9,52	270,42	13
	- twisting of the stick, cm;	53,54	52,75	1,48	7
	- «lock»				
	right hand on top, cm	3,24	11,52	255,56	12
	left hand on top, cm	1,91	8,50	345,03	13

A total of 228 girls aged 6-14 who go in for tennis at sports schools in Moscow and the Moscow region, as well as private academies and clubs, were examined. At the stage of initial training, 71 girls are training and 157 at the training stage. Thus, at least 20 tennis players were examined in each age group.

Results of the study and their discussion. An analysis of the dynamics of indicators of speed, strength, coordination abilities, flexibility and endurance of tennis players aged 6-14 allowed us to establish an improvement in indicators with age, as well as to identify differences in the increments in each test from the value recorded in girls 6 years old to their best result (Table one).

The data obtained are consistent with the conclusions made earlier by other authors [5-8].

The scatter in the values of the increase in results in different tests is large and ranges from 1.48% to 345.03%. As can be seen from Table. 1, the best result was not always recorded at the age of 14. The earliest achievement of the best result is observed in tests associated with speed and speed-strength manifestations that require speed of action - speed of reaction, speed of repulsion, as well as specific mobility of the shoulder joints. In tests that require a greater manifestation of strength abilities, the age of achievement of the best result increases. For a qualitative assessment of the growth rate, we have proposed the following table (Table 2).

Table 2. *Qualitative assessment of the magnitude of the increase in results in tests that assess the physical fitness of tennis players aged 6-14*

Growth rate, %	Qualitative assessment
≤ 10	Very low
≤ 20	Low
≤ 50	Below average
≤ 100	Medium
≤ 150	Above average
≤ 200	High
> 200	Very high

In accordance with the data obtained as a result of the study, a very high increase was registered in the test of knocking the ball with the edge of the racket, which evaluates the spatial accuracy of movements.

A high increase in the dynamometer compression test with the right and left hands - the actual power abilities of the muscles that grip the racket during the performance of the impact are evaluated.

The growth rate is above average - it is noted in the amount of 10 jumps up, by which one can judge the power component of the speed-strength endurance of the muscles of the lower extremities.

The average increase was recorded in the tests: long jump and jumping up, which assess the speed-strength abilities of the muscles of the lower extremities; stuffed ball throwing - speed-strength abilities of the muscles of the upper shoulder girdle; stepping over a stick - the speed of rebuilding movements; six jumps, five of which are performed a little further than the previous one - differentiation of muscle efforts.

The growth rate is below average in the tests: 10-meter run, which evaluates the speed of gaining speed on a long stretch and the speed of a single movement; tilt down - the mobility of the spinal column; “lock” - the mobility of the shoulder joints.

The growth rate is low in the tests: 5 m run, which assesses the speed of speed gain in a short segment and the speed of a single movement; “shuttle” - endurance to a short draw of a point; repulsion time when performing 10 jumps up, by which one can judge the speed component of the speed-strength endurance of the muscles of the lower extremities.

A very low increase was noted in the tests: jumping up with a swing of the arms in relation to jumping up with the arms on the belt - coordination of actions and twisting of the stick, evaluating specific manifestations of the mobility of the shoulder joints.

Each test assessed the manifestation of one of the physical qualities. The magnitude of the increase in the result in a test that evaluates physical quality largely

Table 3. *The degree of trainability of physical qualities in girls aged 6-14 involved in tennis*

Degree of trainability	Physical Quality	Test
Very high	Coordination abilities: spatial accuracy of movements	Hitting the ball with the edge of the racket, quantity
High	Power abilities: absolute hand strength	Dynamometer compression with each hand, kg
Above average	Speed-strength endurance (emphasis on repulsion force)	The sum of 10 jumps up, cm
Medium	Speed-strength abilities: - muscles of the lower extremities; - shoulder girdle; Coordinating abilities: - the speed of rebuilding movements; - differentiation of muscle efforts	 Standing long jump, cm; Jumping up, cm; Throwing stuffed ball, m; Stepping over a stick, quantity; 6 long jumps, 5 of which are a little further than the previous one, cm
below average	Speed abilities: - the speed of picking up speed on a long stretch and the speed of a single movement; - speed of reaction Flexibility: - general; - shoulder joints	 10 m run, s; Start time for light stimulus, s; Tilt down, cm; «Castle», see
Low	Speed abilities: - the speed of acceleration in a short segment and the speed of a single movement; Endurance: - to a short draw of a point (alactic anaerobic); - speed-strength (emphasis on the speed of repulsion)	 5 m run, s; "shuttle", with; Repulsion time when performing 10 jumps, s
Very low	Coordinating abilities: - coordination of actions; Flexibility: - mobility of the shoulder joints	 Jumping up with a swing of the hands in relation to jumping up the hands on the belt,% Stick twist, cm

indicates the degree of trainability of the quality. Thus, based on the results obtained, it is possible to assess the degree of trainability of each physical quality in girls aged 6-14 years old involved in tennis (Table 3).

The listed manifestations of physical qualities are necessary for tennis players to perform the whole variety of striking actions, to play points during the match. And this means that a clear selection of means and methods of training is necessary. This is of particular relevance to the manifestations of those qualities in which a high degree of trainability has not been revealed [9, 10].

The results obtained, which made it possible to establish the degree of increase in physical qualities in the first nine years of a long-term training process, should be taken into account during the initial selection for classes in sports groups. Namely, to clarify and adjust the tests used in the selection in the initial training groups. They must include tests that evaluate physical qualities with a degree of trainability below average, low and very low.

Conclusions. The results demonstrated by tennis players at 14 years old are better than at 6 years old. However, in some tests, the best results were recorded in tennis players under 14 years old. The scatter in the values of the increase in results in different tests is large and ranges from 1.48% to 345.03%. The magnitude of the increase in the result in a test that evaluates physical quality largely indicates the degree of trainability of the quality.

It has been established that in tests evaluating the same physical quality, there is a large scatter in the values of the increase in results, which indicates a different degree of trainability of manifestations of the same quality.

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