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COMPARATIVE ANALYSIS OF THE LEVEL OF SPECIFIC MOTOR SKILLS IN 12-13-YEAR-OLD TENNIS PLAYERS

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ABSTRACT

Tennis is one of the most popular games in our time, which is developing rapidly. A characteristic feature of the modern tennis player is the high level of specific motor qualities and physical fitness.

THE PURPOSE of the study is to establish the level of development of specific motor skills in 12-13-year-old tennis players before and after systematic training during general and special preparation period.

METHODS: The participants of the study are 20 students on average age of 12.8 years. During the experiment, data of level of development of specific motor skills were collected. All data were processed and statistically analysed.

RESULTS: We observe the closest in value results of the indicators of special motor qualities both at the beginning and at the end of the experiment. The mean value of each indicator increases at the end of the experiment. The differences in the results of the study at the beginning and at the end of the experiment are statistically significant.

CONCLUSIONS: We can conclude that at the end of the experiment the closest in value results proves that systematic training were applied in adolescent tennis players. Statistically significant differences in the results are an improvement that the applied training methods lead to the observed changes.

Key words: tennis, adolescent, training methods, physical fitness.

INTRODUCTION

According to Petrov, L. et al. (2011) tennis is one of the most popular games today undergoing rapid development, especially in the new century. In the last 20-30 years, tennis has been among the sports rapidly increasing in popularity (1). The development of the sport itself as well as the increasing number of achievements and records requires development in every aspect related. Any novelty in the methodology of teaching and training is of interest to the theory and practice of tennis.

According to the opinion of Dimov, I. (2018) a characteristic feature of modern tennis players is the high level of physical training, which allows them to participate in 30 to 40 tournaments per year, with each match lasting between 2 and 5 hours. That requires a high level of development of physical and mental qualities as well as of the technique of the game (2). Todorov, T. (1990) is on the opinion that tennis player should be both fast and durable, to move early and to be placed perfectly for the ball to be able to hit it under the most favorable conditions (3).

These requirements make coaches and teachers focus on improving the methodology for training tennis players, i.e. improving the physical parameters of players and their technique. According to Shafarzhik, V. (1989) also is important tennis player to have a good level of psychological training because during tennis matches, the player must rely only on himself (4).

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Zhelyazkov, Ts. and Dasheva, D., (1982) defined physical fitness as a state of functional and psychomotor fitness adequate at certain levels characterized by the requirements of different types of activity (5). According to Toupuzov, I. and Bogdanov, P. (2001), exercise and sports lead to positive changes in the body. They are expressed in the development of basic physical qualities; biochemical, structural, and morphological changes in muscles; biochemical changes in bones, blood, and lymph; improvement of the functions and structure of the respiratory system; improvement of the activity of the cardiovascular system and the metabolism (6). Bachvarov, M. (2003) is on the opinion that physical activity in modern sports is characterized by increased intensity and variety. It manifests all the motor qualities in a different combination depending on the sport (7). According to Tsonkova, D. (2014) most often the motor qualities are manifested in a complex way, but in view of their study and purposeful development they are differentiated (8).

Having accepted these considerations, we have come to the conclusion that good physical training allows a rapid transition of the body from one state to another, more perfect one, which is at the expense of progressive functional, morphological, and biochemical changes. This is especially important for the adaptation of tennis players to higher psycho-physical load and tension in the training process. A major component of tennis players' readiness for competitions is physical performance.

For modern tennis players, the technical performance of different types of strokes is important. By themselves, however, they do not bring the necessary success without adequate age-appropriate physical or so-called conditioning training. The age of 12-13 years is of particular importance for the conditioning training of tennis players. This age is considered prepubertal and this is when it is necessary to apply the principle of gradualness in the training process. There is a smooth transition to the inclusion of an increasing number of special-preparation exercises and the development of specific motor skills.

Looking in the specialized literature, we found publications by authors (Gardeva, M. et all, 2004; Simeonov, K., 2008; Kolev, P., 2016; Simeonova, T., 2017) who studied motor skills at the same age in other sports, which helped us determine our research methodology (9-12).

Our research is consistent with the periodization in tennis, which according to Unierzyski, P. (2005) should provide players achieving training goals, maintaining a balance between general and specific training methods, as well as between participation in tournaments and the development of motor qualities (13).

The purpose of the present study is to establish and compare the level of development of specific motor skills in 12-13-year-old tennis players before and after application of training impact in the preparatory period of sports training.

MEATERIALS AND METHODS

The study included 20 tennis players aged 12-13 years, of which 10 boys and 10 girls from Harmanli Tennis Club and Svilengrad Tennis Club. The athletes had been involved in this sport since early childhood, had participated in a number of both national and international competitions, and were training 5 to 6 days a week.

The contingent of the study is presented in **Table 1.**

Table 1. *Characteristics of the contingent of the study*

Indicator No.	**Number**	**%**
1. Number of tennis players	20	100
2. Sex		
Boys	10	50
Girls	10	50
3. Average age	12.8	
12-year-old	8	40
13-year-old	12	60

To achieve the goal and accomplish the tasks, a wide range of methods were applied in the study to determine the level of development of the specific motor skills of the adolescent tennis players.

The study was conducted during the training process of the tennis players of Harmanli Tennis Club and Svilengrad Tennis Club in October 2020 - February 2021.

The tests took place in the last week of each month. The tennis players were entitled to 3 attempts for each test, and the best result obtained was taken into account.

The test battery included the following tests that are illustrated in **Table 2.**

Table 2. *Test battery*

TESTS	Number of attempts	Direction of growth	Measuring units
1. 10 m dash	3	+	s
2. 20 m dash	3	+	s
3. 30 m dash	3	+	s
4. 50 m dash	3	+	s
5. Long jump from standing position	3	+	m
6. Figure-of-eight agility run	3	+	s
7. T-test for dexterity	3	+	s
8. Shuttle run	3	+	s

The period from October 2020 to February 2021 was preparatory for the tennis players of this age. It served to build motor skills based on the general physical training and special physical training. In this study, the general physical training accounted for 75% of the preparation period and the special physical training - for 25%. In the general physical training, the emphasis was put on methods for building the qualities of endurance, strength, speed and strength endurance, explosive force, and flexibility. Speed and agility were emphasized in the second special-preparation stage of the general-preparation period. The main means of strength training were motor activities that increased resistance, or strength exercises. The main method used for development of strength of the tennis players was the repetition method, in which the tennis players did many different types of exercises against resistance with maximum speed of movements, which were close to tennis as a game. Strength exercises should be performed when the central nervous system is fresh. This requirement provides a greater increase in muscle strength. Speed-strength exercises should precede static isometric exercises. The speed and strength capabilities of tennis players are improved with specific means and motor activity, the performance of which requires explosiveness of muscle efforts.

Aerobic qualities are the basis on which all the conditioning training of tennis players is built. To improve aerobic capacity, it is necessary to include a large number of muscle groups and long-term, continuous impact of physical effort. For this purpose, the most suitable methods are the continuous, uniform, continuously variable, and interval methods.

During the special training part of the tennis players' training, the emphasis is put on the development of skills that are close to the dynamics of tennis. For this purpose, attention was paid to the qualities of speed, agility, flexibility, speed of reaction, and speed of individual movements.

According to Dimov, I. (2018) addition to the traditional runs at maximum pace, the main means of developing speed in tennis are reduced to a wide range of game exercises with and without a ball, with and without a racket, the coordination structure of which does not differ from the structure of game actions in tennis (2).

The main methods for developing the quality of speed are the repetition method and the method of responding to unexpected signals for the development of simple and complex responses.

RESULTS

The results of the study make it possible to assess whether the training tools applied in the preparatory period led to the necessary and desired changes in the functional level of the athletes. The analysis of variance presented in **Table 3** shows the degree of dispersion of the traits studied, the distribution of the sample, and the average level of development of the indicators studied.

Table 3. *Analysis of variability of the specific physical qualities of the tennis players in the beginning of the study (October 2020)*

Study method	min	max	R	$\bar{x}$	Sdev	V%
10-metre dash	1.99	2.33	0.34	2.16	0.11	0.012
20-metre dash	3.55	3.85	0.30	3.71	0.09	0.008
30-metre dash	4.78	5.94	1.26	5.36	0.32	0.1
50-metre dash	8.10	11.38	3.28	9.74	0.68	0.47
Long jump from standing position	1.34	2.01	0.67	1.67	0.14	0.02
Shuttle run	12.44	14.24	1.80	13.34	0.52	0.27
Figure-of-eight agility run	11.01	13.73	2.72	12.37	0.9	0.81
T-test for dexterity	12.72	14.31	1.69	13.51	0.43	0.18

Table 4 shows the average values and variability of the studied indicators of the tennis players in the second study conducted just before the competition period (February 2021).

Table 4. *Analysis of variability of the specific physical qualities of the tennis players in the end of the study (February 2021)*

Study method	min	max	R	$\bar{x}$	Sdev	V%
10 m dash	1.68	1.94	0.16	1.81	0.07	0.006
20 m dash	3.08	3.47	0.39	3.27	0.11	0.012
30 m dash	4.33	4.83	0.50	4.58	0.11	0.01
50 m dash	7.41	8.03	0.62	7.73	0.18	0.03
Long jump from standing position	1.68	2.14	0.46	1.84	0.11	0.01
Shuttle run	11.90	9.96	1.94	10.93	0.32	0.10
Figure-of-eight agility run	11.08	9.66	1.42	10.93	0.32	0.14
T-test for dexterity	10.30	8.84	1.46	9.57	0.41	0.17

Table 5 shows the differences between the mean values of the specific motor skills of the tennis players in the first and second studies.

DISCUSION

The analysis of variance of the results presented in Tables 3 and 4 shows that the dispersion of all traits was weak, even at the beginning of the experiment. This was due to the density of the results of the subjects, which speaks of equalization of their achievements as a result of several years of training impact to which the children were subjected. The coefficient of variation and the standard deviation were very low in all indicators at the beginning and end of the experiment, and in the second test the values were slightly lower, which indicates an even greater density of children's results in the second study. The mean values show that the results improved in the second study.

Table 5. *Comparative analysis of the specific motor skills of the tennis players in the beginning and in the end of the study (October 2020 - February 2021)*

Study	**$\bar{x}$ 1**	**S 1**	**$\bar{x}$ 2**	**S 2**	**d**	**t**	**Pt**
10 m dash	2.16	0.11	1.81	0.07	0.35	3.33	99%
20 m dash	3.71	0.09	3.27	0.11	0.44	9.88	99%
30 m dash	5.36	0.32	4.58	0.11	0.78	4.9	99%
50 m dash	9.74	0.68	7.73	0.18	2.01	2.31	97%
Long jump from standing position	1.67	0.14	1.84	0.11	0.17	7.67	99%
Shuttle run	13.34	0.52	10.93	0.32	2.41	7.21	99%
Figure-of-eight agility run	12.37	0.9	10.93	0.32	1.44	1.38	83%
T-test for dexterity	13.51	0.43	9.57	0.41	3.94	7.91	99%

The comparative analysis made in Table 5 gives an idea of the level of the average values of the specific motor skills at the beginning and end of the study conducted, as well as the registered differences and the statistical reliability supporting the differences.

The *10 m dash* test, which is for speed and reaction speed, (Table 5), showed an average of 2.16 s in October and 1.81 s in February, with a statistically significant difference of 0.35 s (Pt>99%). It can be considered that immediately before entering the competition period, the results of the test was satisfactory and was due to the applied training impact.

In the *20 m dash test* (Table 5), an average of 3.71 s was observed in the first study, compared to 3.27 s in the second study. The difference in the average value of 0.44 s is supported by a high guarantee probability Pt>99% and speaks of a positive result of the applied speed methods during the training process.

In the *30 m dash* test, an improvement of 0.78 s was observed, which is statistically significant (Pt>99%), which means that the very good result reported was due to the training impact. The maximum and linear speeds reached by the tennis players were significantly improved during the training period.

The *50 m dash* is both an indicator of speed and of improvement of the linear speed and its retention for a longer period of time. This test is necessary because it uses the speed force needed in dynamic court games.

There is a difference of 2.1 s in the average value, which is supported by a high guarantee probability (Pt>97%), on the basis of which we can assume that the applied impact led to a positive increase in the results of the test.

The *long jump* from standing position test shows a difference between the two studies of 0.17 m, which is statistically significant (Pt>99%). The result is an indicator of more stable results before the competition period and an increase in the explosive power of the lower limbs. The average value of 1.34 m in the first test reported a significant improvement in the second, with the average value reaching 1.84 m.

The *shuttle run* test examines the explosive power of the lower limbs, the speed and the ability to quick change the direction of movement in dynamic conditions, which are characteristic of tennis. The difference in the average value, which is very important in this case and largely determines the dynamics of tennis players on the court, is 2.41 s and is statistically significant (Pt>99%). We believe that the large increase in the dynamics of movements of the tennis players was due to the applied impact.

The *figure-of-eight agility run* test examines the agility and ability to quickly rearrange the body at maximum speed. The average value of this indicator was 12.37 s at the beginning against 10.93 s in February. However, the difference of just over 1.44 s is not statistically significant (Pt>87%) and we cannot say with certainty that the positive increase in the results was due to the applied impact. We assume that with a larger

sample this increase would be statistically significant.

The *T-test* also reflects the agility of tennis players, as well as the speed when changing direction. The average value from the first study was 13.51 s for overcoming the distance, and from the second study, this indicator was 9.57 s. The difference of 3.94 s is statistically significant (Pt>99%) and reflects improved agility, which is essential in baseline plays as well as in net play.

CONCLUSION

The analysis of variance of the results of the study shows that the dispersion of all traits was weak, even at the beginning of the experiment, which in our opinion was due to the systematic training impact to which the children were subjected. The coefficient of variation and standard deviation were very low in all indicators at the beginning and end of the experiment, and in the second test the values were slightly lower, which indicates an even greater density of the children's results in the second study.

The average values of all studied indicators show that the results improved in the second study, which indicates a high success of the applied training tools and methods. Of all the tests used, only in the figure-of-eight agility run test there was no statistically significant difference observed. We believe that this may be due to the small contingent of the subjects or the insufficient means aimed at improving the quality of agility and the ability to quick change the direction of the body, which is indicative for the future training work and the planning of the training process.

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