



Effect of Muscular Endurance Exercises in Developing Some Biokinetic Abilities and the Depth of Serve in Tennis for Ages 14-15 Years

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The aim of the research is to prepare muscular endurance exercises and to identify their effect in developing some biokinetic abilities and the depth serve of tennis players for ages 14-15 years. And through the work of specialized researchers and observation of most of the tournaments, they found that there is a deficiency in the performance of the serve skill for most of the juniors. Where the performance in the serve is slow and weak, and the player is not able to take advantage of this skill directly and they found that the junior hits the serve weakly, and thus it is easier for competitors to return. The researchers attribute this to the low level of muscular ability among young players, so the researchers went through this scientific attempt and used the experimental method with two equal groups in the pre and post-tests. The research community represented Baghdad players for ages 14-15 years, with 15 players, they were divided into 3 groups, 5 players for the exploratory experiment and 5 players for the control sample, as well as 5 players for the experimental sample, where the pre and post-test were made and the results were discussed, the following conclusion was reached that there is a positive effect of muscular endurance exercises in developing some biokinetic abilities and the depth serve in tennis for 14-15 year old players.

Keywords: Muscular endurance exercises - biokinetic abilities – depth of serve in tennis.

1. Introduction

Modern sports training for various sports is a planned educational process based on modern scientific methods. The intention behind it is to choose the best training methods and their applications in the most appropriate methods and means consistent with the characteristics of sports activity to reach young people to advanced positions in various activities, and this is

what the developed countries of the world seek as the high level of performance reflects the reality of properly planned training, the result is the development of physical fitness for young people, and thus the development and upgrading of their skillful performance to reach international levels.

Biokinetic abilities are the basis of tennis players, where the tennis player needs high kinetic abilities to move from one place to another at full speed, as well as the physical aspect, as it needs muscular ability, strength and speed, as well as the explosive ability of the arms and legs and flexibility. The serve is one of the most important basic skills that the player must master perfectly, and through it the serving player can get a direct point if it is difficult for the receiving player to block it. Also, the forehand and backhand are no less important than the serve, which the player can perform with strength and accuracy so that it is difficult to the opponent to return.

In view of the development in the level of all sports, including tennis, the speed of transmission hits has increased to a very high level, which requires the player to have good muscular ability, which means developing the explosive ability of both arms and legs, as well as to the speed of reaching the ball at full speed and the fact that the game of tennis lasts for hours the athlete needs adaptations or changes to give her the ability to perform, hence the importance of research in preparing muscular ability exercises to develop some biokinetic abilities and depth of serve skill for tennis players for the ages of 14-15 years.

And service is one of the most important basic skills in the sport of tennis, which the player must successfully master and mastering it with accuracy, strength and speed for the player's performance facilitates for him to obtain a direct point. Where it is difficult for the receiving player to block it, and the player's performance to serve depends on the efficiency of the player's biokinetic abilities, which enables him to perform this skill with strength, speed and high accuracy that enables the player to obtain the largest number of points to win the match.

Research problem:

Through the work of specialized researchers and observation of most tournaments, they found that there is a deficiency in the performance of the transmission skill in most juniors, as the performance in serve is slow and weak, and the player is unable to benefit from this skill directly. It was found that the junior hits the serve weakly. Thus, it is easy for competitors to return, and the researchers attribute this to the low level of muscular ability of young players, so the researchers engaged in this scientific attempt to prepare muscular strength exercises to develop some biokinetic abilities and the depth of serve in tennis, and the impact of these exercises on tennis players for ages 14-15 years.

Research objective:

The objectives of the research are to prepare muscular endurance exercises in developing some of the biokinetic abilities and the depth of serve for tennis players for ages 14-15 years. And to identify the effect of muscular endurance exercises in developing some of the biokinetic abilities and the depth of serve for tennis players for ages 14-15 years.

Research methodology and field procedures:

2. Research Methodology:

The researchers used the experimental method, using the experimental design with (pre and post-test) for two groups, one experimental and the other control, due to its relevance to the nature of this research.

Research community and sample:

The researchers identified the research community with the players of the training center in Baghdad for ages (14-15) years, and their number is (15) players.

Sample exploratory experiment: The exploratory research sample was selected from within the research community and outside the main research sample, and they were (5) players.

Main sample: The main sample of the research was selected from the research community of Baghdad players, provided that they had not participated in the exploratory experiment, and their number was (10) players, and the percentage of the main sample from the total research community was (66.67%). The main research sample was divided into two groups, one of them was a control group and numbered (5) players, which underwent (the method followed by the coaches) in training. And the experimental group numbered (5) players, which were subjected to the use of muscular ability exercises to develop some biokinetic abilities and the depth serve in tennis. The following table shows the distribution of the research community and sample.

Table (1) community and sample research:

Statement	Total Society	The study sample			
		Exploratory sample	Main sample		
			Experimental group	Control group	Total
Number	15	5	5	5	10
Percentage	%100	%33.33	%33.33	%33.33	%66.67

n1=5 n2=5 significance level (0,05)

Means, devices and tools used in the research:

Data collection methods:

A survey of specialized scientific references with the aim of:

- Determining and limiting physical and skill tests that fit the research variables.
- Preparing "muscular endurance exercises in developing some biokinetic abilities and the skill of the depth of the serve in tennis for ages 14-15 years".

personal interview:

The researchers conducted a personal interview with experts in the sport of tennis in order to obtain their opinion on the content of the training program.

Forms:

- A survey form for the experts' opinion on the appropriateness of the measurement tools.
- Expert opinion survey form regarding the content of the prepared training exercises.
- Data registration form for the research sample.

Tools and devices used in the research: (tape measure - medicine balls - tennis rackets - tennis balls - 1 hp computer - Adhesive tapes)

Tests used in the research:

First: Physical test:

- Flexibility test "right".
- Flexibility test "left".
- Sargent's vertical Jump Test.
- Throwing a medicine ball over the head test.

Second: skillful tests:

- Depth of service

Exploratory study:

The researchers conducted the first exploratory experiment to survey the opinion of the experts from the faculty members in the faculties of physical education, with the aim of:

- Determining the physical and skill tests used in the research
- Determining the content of prepared exercises using muscular endurance exercises in developing some biokinetic abilities and the depth of tennis serve for ages 14-15 years
- Verification of the scientific transactions (validity, reliability) of the measurement tools, where the researchers applied the measurement tools to the "exploratory sample", which consisted of (5) players, who were selected from the research community and outside the study sample.

The exercises prepared using muscular endurance exercises to develop some of the biokinetic abilities and the depth of the serve in tennis for the players:

The researchers designed the program using muscular endurance exercises to develop some of the biokinetic abilities and the depth of the serve in tennis, in light of the physical abilities of the research sample and in light of the prepared exercises.

The proposed training program aims to raise the abilities of tennis players (14-15 years) of the research sample, both physically and skillfully, by using muscular endurance exercises to identify their impact on some biokinetic abilities and the depth serve in tennis for players for ages (14-15 years).

- Exercise application steps:

Pre-test:

The researchers conducted a pre-test on the research sample of the two groups (control and experimental) consisting of (10) players, in the period from Sunday 14/11/2021 until Monday 15/11/2021.

Exercise application:

The researchers applied the prepared exercises using the muscular endurance exercises for the experimental group, and the method followed by the coaches for the control group, for a period of (8) weeks at (3) sessions per week on Sundays, Tuesdays, and Thursdays, for the period from Sunday 21/11/2021 Until Thursday, 13/1/ 2022 .

Post-test:

The post-test was carried out after completing the application of the exercises prepared on the experimental group and the method followed by the coaches for training on the control group, in the period from Sunday 16/1/2022 to Monday 17/1/2021. It was considered for the post-test to be under the same conditions which the pre-test was performed.

Statistical Means: The statistical package (spss) was used.

- Arithmetic Mean.
- Standard Deviation.
- Wilcoxon Test.
- Mann Whitney.
- coefficient (person) Simple correlation.

3. Presentation and discussion of results:

Table (2) Statistical characterization of the two tests (pre and post) of the research group (control) in the variables.

Variables		group	N	Mean	Std. Deviation	less value	High value	Rate %
physical	Flexibility "right"	Pre	5	29.614	2.148	27.900	32.180	3.67
		Post	5	28.528	1.772	27.050	30.700	
	Flexibility "lift"	Pre	5	29.380	2.085	27.320	31.980	1.39
		Post	5	28.972	1.888	27.220	31.270	
	Sargent's vertical jump	Pre	5	31.400	2.702	28.000	35.000	3.18
		Post	5	32.400	2.702	29.000	36.000	
		Pre	5	8.428	0.847	7.130	9.420	2.94

	throwing a medicine ball over the head	Post	5	8.676	0.794	7.440	9.610	
skill	depth serve	Pre	5	53.200	5.541	48.000	62.000	4.51
		Post	5	55.600	6.025	50.000	65.000	

Table (3) The significance of the differences between the mean ranks of the measurement degrees (pre- and post-test) for the research group (the control group) in the variables under research.

Variables	Test	Signal type	N	Total ranks	Average rank	Z. value	Sig level
physical	Flexibility "right"	Negative	5	15.00	3.00	2.023-	0.043
		Positive	0	0.00	0.00		
		Equality	0				
	Flexibility "lift"	Negative	5	15.00	3.00	2.032-	0.042
		Positive	0	0.00	0.00		
		Equality	0				
	Sargent's vertical jump	Negative	0	0.00	0.00	2.236-	0.025
		Positive	5	15.00	3.00		
		Equality	0				
	throwing a medicine ball over the head	Negative	0	0.00	0.00	2.023-	0.043
		Positive	5	15.00	3.00		
		Equality	0				
skill	depth serve	Negative	0	0.00	0.00	2.070-	0.038
		Positive	5	15.00	3.00		
		Equality	0				

The researchers attribute the existence of differences between the two tests, before and after the control group, to the fact that the muscular ability exercises affect the level of physical sports performance of the players and these exercises affect the improvement of the skill performance of the players, but not by much. The lack of improvement could be due to the lack of organization in the muscular endurance training of this group.

The muscular ability is one of the components that bring the player to the highest levels in the sport of tennis. It also affects the other components of physical fitness such as speed and endurance, as the muscular ability exercises based on strength and speed need a degree of flexibility for the joints and the elasticity of the muscles in order to overcome their resistance at high speed and force out at its maximum. (Frag, Elaine Wadih, 2007, p. 188)

Through the previous presentation, the researchers see that the imperfection of the training load leads to a decrease in the physical abilities of the athlete as a result of the confusion in the performance of the internal functions of the body, and thus the lack of growth of sporting achievement and failure to achieve it in an optimal way, as well as the irregular repetition of the sports training procedures. Thus, the first hypothesis has been fulfilled, which states that “there are statistically significant differences between the two tests (pre and post-test) in the biokinetic abilities and the depth of tennis serve under study for the ages of 14-15 years among the members of the control group”.

Table (4) Statistical characterization of the two tests (pre and post) of the (experimental) research group in the research variables.

Variables		group	N	Mean	Std. Deviation	less value	High value	Rate %
physical	Flexibility "right"	Pre	5	29.552	2.179	27.740	32.220	12.22
		Post	5	25.942	0.968	25.020	27.300	
	Flexibility "lift"	Pre	5	29.348	2.085	27.260	31.950	12.46
		Post	5	25.690	1.122	24.390	27.320	
	Sargent's vertical jump	Pre	5	32.000	2.550	29.000	35.000	15.00
		Post	5	36.800	1.924	34.000	39.000	
	throwing a medicine ball over the head	Pre	5	8.528	0.763	7.350	9.380	12.41
		Post	5	9.586	0.529	8.760	10.240	
skill	depth serve	Pre	5	54.000	6.819	45.000	63.000	33.33
		Post	5	72.000	7.483	62.000	82.000	

Table (5) The significance of the differences between the average ranks of the measurement degrees (pre- and post-test) for the (experimental) research group in the research variables.

Variables	Test	Signal type	N	Total ranks	Average rank	Z. value	Sig level
physical	Flexibility "right"	Negative	5	15.00	3.00	2.032-	0.042
		Positive	0	0.00	0.00		
		Equality	0				
	Flexibility "lift"	Negative	5	15.00	3.00	2.023-	0.043
		Positive	0	0.00	0.00		
		Equality	0				
	Sargent's vertical jump	Negative	0	0.00	0.00	2.041-	0.041
		Positive	5	15.00	3.00		

skill	throwing a medicine ball over the head	Equality	0			2.023-	0.043
		Negative	0	0.00	0.00		
		Positive	5	15.00	3.00		
		Equality	0				
	depth serve	Negative	0	0.00	0.00	2.060-	0.039
		Positive	5	15.00	3.00		
		Equality	0				

The researcher attributes the differences between the pre and post-test of the experimental group to the positivity of the organized training program, which is based on sound and regulated scientific foundations in the formation of training loads for anaerobic exercises in terms of intensity, volume, number of repetitions and groups, observance of the proper timing for repetition of training periods, the ideal balance between work and rest periods, and observance of sport training principles had a positive effect on the steady improvement in the post-test of the experimental group.

The researchers attribute the improvement in the values of the pre and post-tests, and in favor of the post-test of the experimental group, to the positiveness of the exercises prepared, organized and laid out on the basis of sound and regulated scientific foundations in the formation of training loads for anaerobic exercises in terms of intensity, size, number of repetitions and groups, and observance of the proper timing for repetition of training periods and the ideal balance between periods of work, rest and observance of the principles of sports training had a positive effect on the steady improvement in the post-test of the experimental group in the post-test.

Training on scientific bases takes makes what is called adaptation with the improvement of physical performance and this is the effect of training and all training leads to a response to stress and produces one degree of fatigue and the recovery process takes place after a period of time, but the repetition of training and the increase in its intensity and duration of training in addition to the lack of nutrition and its imbalance and psychological stress makes recovery incomplete, the adaptability decreases, and the physical performance and skills decrease (Heshmat, Hussein and others. 2013, p. 333)

The muscular ability of some games that are not limited in time and depend on the success of the skillful and tactical performance in them mainly to the player's ability to maintain a high level of strength and speed in performance until the end of the match, which requires him to do a large amount of work during the time of the match, which is expressed in ability. (Saleh, Ali Zuhair. 2005 p. 26)

The importance of training the muscular ability of the tennis player, as the muscular system is able to overcome resistances that require a high degree of speed of muscle contractions, and it is in line with the nature of skillful performance in tennis, as it ensures its highest effectiveness under the conditions of competition, especially in jumping to perform serve and smashes, in order to obtain muscular ability, the player must be characterized by a

high degree of explosive ability of the arms and legs, and a high degree of skill in integrating both speed and muscular strength in one mold to obtain a high result in the implementation of the movements and strikes that require it, and given that the game of tennis needs to move towards the ball to perform each stroke. (Farag, Elaine Wadih.2007, p.189)

The researchers attribute the improvement in the values of the pre and post-tests, and in favor of the post-test of the experimental group, to the positive effect of the exercises prepared, organized and laid out on the basis of sound and regulated scientific foundations in the formation of training loads for anaerobic exercises in terms of intensity, size, number of repetitions and groups, and observance of the proper timing for repetition of training periods and the ideal balance between periods of work and rest, taking into account the principles of sports training and their suitability for the research sample in terms of age and gender, and that these exercises targeted the different abilities of the sample members, as it contained a set of different exercises for the elements of physical fitness, which aimed to develop the element of muscular ability for the players, and this was followed by an improvement in the skill performance and an increase in the depth of the strike and the depth of the serve, and thus the development of the skill level was explained in a steady and significant way. It had a positive effect for the steady improvement in the post-test of the experimental group in the post-test.

Table (6) The significance of the differences between the two post-tests of the two experimental and control groups: n1=n2=5

Variables		Group	N	Mean	Total	U	Sig
physical	Flexibility "right"	Experimental	5	3.40	17.00	2.000	0.032
		Control	5	7.60	38.00		
	Flexibility "lift"	Experimental	5	3.20	16.00	1.000	0.016
		Control	5	7.80	39.00		
	Sargent's vertical jump	Experimental	5	7.60	38.00	2.000	0.032
		Control	5	3.40	17.00		
	throwing a medicine ball over the head	Experimental	5	7.60	38.00	2.000	0.032
		Control	5	3.40	17.00		
skill	depth serve	Experimental	5	7.80	39.00	1.000	0.016
		Control	5	3.20	16.00		

The researchers attribute the improvement in the physical and skill variables and in favor of the post-test of the experimental group to the positivity of the organized training program that is based on sound and regulated scientific foundations in the formation of training loads for anaerobic exercises in terms of intensity, size, number of repetitions and groups, taking into account the proper timing for repetition of training periods and the ideal balance between work and rest periods and taking into account the principles of sports training and their relevance to the nature of the age group applied to them in terms of gender, training age and chronological age, the improvement in physical exercise indicators between the

performance of the experimental and control groups, as well as the increase in the depth of service, is due to the ideal training program applied to the training group, and that the percentage of improvement in the control group was less than the percentage of improvement in the experimental group as a result of confusion and the promise of proper planning of the training loads applied to them, and this in turn this leads to the failure of conditioning processes, and consequently, the progress and skill development of the players decreases.

The lack of proper planning for the proportionality between work and rest, the misuse of the appropriate timing to perform the training load, the reliance on the use of one of the methods and means of training, the failure to adhere to the gradual increase in the training load, the failure to give sufficient rest, or the large number of participations in competitions. (Fattah, Abu Ela Abdel. 1999, p. 31-34)

The conclusions included that there is a positive effect of muscular endurance exercises in the development of some biokinetic abilities and the depth of the tennis serve for 14-15 years old players. And the recommendations on the necessity of using muscular endurance exercises to develop some of the biokinetic abilities and the depth of serve in tennis for 14-15 years old players and for all age groups.

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