

## **The effect of special exercises and electrical stimulation on some working muscles for the serve in volleyball for youth**

**Aqeel Yousif Naser Hussein Al-tae<sup>(1)</sup> , Prof. Dr. Anees Hussein Ali , Assist. Prof. Dr. Samer Ahmed Hasan**

<sup>(1)</sup> Ph.D. Student. Faculty of Physical Education and Sports Sciences / University of Babylon, Iraq.

<sup>(2)</sup> Faculty of Physical Education and Sports Sciences / University of Babylon, Iraq.

<sup>(3)</sup> Faculty of Physical Education and Sports Sciences / University of Babylon, Iraq.

[ay.altaee76@gmail.com](mailto:ay.altaee76@gmail.com) , [aneesalsady0@gmail.com](mailto:aneesalsady0@gmail.com) , [dr.samera.hassan@gmail.com](mailto:dr.samera.hassan@gmail.com)

### **Abstract**

The purpose of this paper is to preparing special exercises and electrical stimulation on some working muscles for the spiking serve of volleyball for youth, identifying the effect of electrical stimulation on some working muscles, Spiking serve in volleyball for youth, The research community was determined from the first-class volleyball players for the youth category in the province of Babylon, aged (17-19) years, numbering (60) players, and the main sample was selected from Al-Hashmiya Sports Club with (22) players, and after excluding the libero players, their number became (20). ) player for the main experiment, and they were divided in a simple random way (the lottery) into two control and experimental groups with (10) players for each group. The results that the researcher came out with that the exercises using the electrical stimulation device contributed effectively and directly to the economy of time and effort and achieved a positive impact on the development of working muscles Spiking serve in volleyball for young people, and among the recommendations that the researcher came out with the need to emphasize that the training curriculum includes influential vocabulary in the performance of the Spiking skill serve also develops the muscles in proportion to the extent of the muscular work of the skill and develops the elements involved in the technical performance of the skill spiking serve with the volleyball for youth.

### **Introduction:**

Volleyball is one of the group sports that is widely practiced and occupies a good position, as it has become today very beautiful and wonderful in its physical and motor skills and made those who practice it desire to express its performance perfectly, as it is a mixture of many different skills, whether offensive or Defensive participation to appear in an artistic board in which the players individually express their ability to perform these skills, which appear in the form of a skillful movement sequence that impresses the audience, especially when the points are scored with high skill, accuracy and speed by the players.

Scientific progress and technological development have introduced many technologies and devices that contribute to accelerating athletes' access to advanced levels. Electrical stimulation has a major role in increasing muscle strength by recruiting the largest number of motor units, which contributes to increasing the amounts of strength. Deep muscles can be reached through signals. The electricity that it emits to the muscle through the electrodes attached to the skin, especially the muscles in the middle of the body, which creates a balance

in the amounts of muscle strength between the working and opposite muscles, and thus can reduce injuries. From the foregoing, the importance of research in crystallizing applied ideas, as well as the important interrelationship between physiological and anatomical processes and their impact on the movements that occur related to skillful performance, spiking serve, and the use of modern technologies that achieve the desired goal with less effort and time and with high effectiveness, as well as the use of special exercises through movements similar to performance To avoid censorship in use.

**Research problem:**

Through the researcher's follow-up to the volleyball field and his observations of the Iraqi and club matches in general, he noticed a weakness in the skill performance of the crushing serve, which negatively affects the accuracy, so it was necessary to pay attention to this skill by the coaches and researchers, not only in terms of educational and training programs, but in terms of improving the level of performance The technical (technical) of this skill will be improved by focusing on training it using advanced scientific exercises, equipment and techniques to help in that.

**Research Objectives:**

- Preparing special exercises for electrical stimulation to affect the electrical activity of the muscles and the accuracy indicator, spiking serve, in volleyball for youth.
- Recognizing the effect of exercises for electrical stimulation, electrical muscle activity, and the accuracy index of spiking serve in volleyball for youth.
- Recognizing the preference of differences in the post-test of the experimental and control groups for working muscles and the index of accuracy, spiking Serve, in volleyball for youth.

**Research methodology and field procedures:**

**Research Methodology:**

Choosing the appropriate curriculum is a necessity of scientific research, as scientific research methods have varied so that the researcher can choose the one that suits the problem.

**Research community and sample:**

The research community was determined from the first-class volleyball players for the youth category in the province of Babylon at ages (17-19) years, and their number was (60) players, and the main sample was selected from Al-Hashmiya Sports Club with a number of (22) players after excluding the libero players, their number became (20) ) players for the main experiment, and they were divided by the simple random method (lots) into two groups, control and experimental, with (10) players for each group.

## **Tools, means and devices used in the research:**

### **Research Tools:**

- Sources and references.
- Tests and measurements.
- Note.
- personal interview.
- Questionnaire forms.
- The World Wide Web.

### **Devices and tools used in the research:**

- A Chinese-made Dell computer.
- Electrical stimulation device.
- Electromagnetic device (EMG).
- Number 10 poles made of plastic, 30 cm high, of Chinese origin
- Fox whistle number 2 Chinese origin.
- 5 colored adhesive tape.
- Pens and papers.
- 10 legal volleyballs of Chinese origin.

### **Description of the tests used:**

#### **Throwing a medicine ball from a chair: (Tyreodore Bomba. 2010 )**

- Purpose of the test: To measure the explosive power of the two arms.
- Test requirements: medical balls weighing (2 kg), iron chair, 2 belts, camera, tape measure, referee, recorder, whistle, space area not less than (30 m) in length and (5 m) width, medical scale.
- Description of the test: After taking the amount of mass for the laboratory, he sits on the chair with the feet flat on the ground, both the hips and chest are tied with a belt, and under these conditions, only the arms perform the process of throwing the medical ball, and the ball is behind the head and is held by both hands and the elbows are bent, and when given Referee: The start signal (whistle) The laboratory swings the arms forward strongly and at maximum speed to throw the medicine ball as far as possible, The researcher has photographed the performance of the test to extract the time to be used in the explosive power law to calculate it in watts, as shown in the figure (1).
- Recording: After extracting an amount of mass for the arms and the ball, each tester is awarded three attempts and the best attempt is counted.

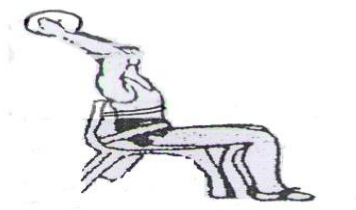


Figure (1) shows throwing a medicine ball from sitting on a chair

#### **Vertical jump test: (Tyreodore Bomba. 2010 )**

- Purpose of the test: To measure the explosive capacity of the muscles of the substance of the legs.
- Test requirements: vertical jumping board (30 x 150 cm) (marked in centimeters and fixed on the wall at a height of one meter from the ground), camera, tape measure, recorder, referee, whistle.
- Description of the test: The tester stands barefoot with his whole foot on the ground and facing the wall, and points with his hand as high as possible above his head. Then the tester moves to a comfortable position on the wall. When the referee gives the start signal, the tester bends the legs slightly and jumps as high as he can and touches the board With the maximum jump height and the body must not rotate, the researcher will photograph the performance of the test to extract the time from the moment the foot leaves the ground to the moment the plate is touched by the hand to use it in the explosive power law to calculate it in watts.
- Recording: The recording is to the nearest (cm) from the height in the standing position to the jump height mark indicated by the player on the board. The explosive power of the muscles of the legs and torso was measured.

#### **Spiking serve accuracy test of volleyball: (Marwan Abdel Majeed Ibrahim. 2001)**

- The purpose of the test: To measure the accuracy of the volleyball player's Spiking serve skill.
- Equipment: a legal volleyball court, a tape for setting goals, (7) legal volleyballs, dividing the prepared field as shown in the figure below.
- Performance specifications: The laboratory performs a Spiking serve, directing the ball to areas (A - B - C - D).
- Conditions :- Each player has ten consecutive attempts.
- In the event the ball touches the net and reaches half of the planned playing field, or goes outside, an attempt is counted for the player (among the ten attempts) and a point is not counted.
- Recording:
  - Points for each attempt inside area (A).
  - Points for each attempt inside area (B).
  - One point for each attempt inside area (C).

- One point for each attempt inside area (D).
- (Zero) when the ball falls outside these areas.
- When the ball falls on a common line between two areas, the score of the higher area is calculated.
- The attempt shall be canceled if the laboratory commits a legal error.
- The maximum score for the test is (40) degrees.

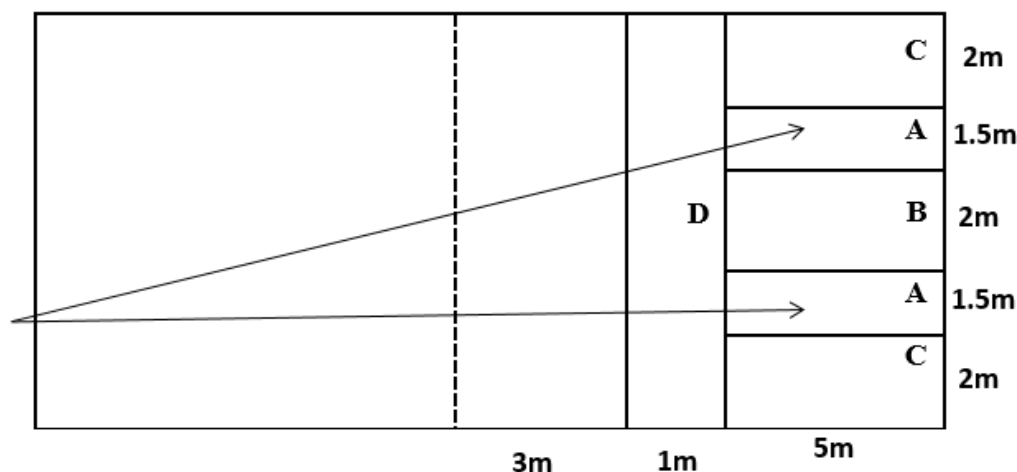


Fig.2 Shown method of testing the accuracy of spiking serve

### Exploratory experiences:

The researcher conducted an exploratory experiment on (Monday) corresponding to (25/5/2021) on a group of (10) players in the exploratory sample, to take advantage of the following matters:

- Testing the validity of the tools and equipment used in the tests
- Extracting the scientific basis for the tests.
- Calculating the time taken for exams and arranging them appropriately.
- Clarify and train the work team on the tests used.
- Validity and suitability of the exercises to the level of the research sample members.
- Calculate the performance time for each exercise.
- Determine the appropriate rest time between repetitions and sets.

The reconnaissance experiment has successfully achieved the purpose for which it was prepared.

- The results of the experiment resulted in:
- All tests and equipment used in the experiment are working.
- Many of the difficulties that occurred while working on the main experiment were overcome.
- The number of the assistant team members is sufficient for all procedures.
- All the candidate tests are honest and have a high formative basis.

### **Pre-test**

The pre-test was conducted on the research sample on (Wednesday) corresponding to (2/6/2021), at the Al-Qasim Volleyball Sports Club stadium according to the following procedures:

- Organizing and arranging the test venue and preparing the necessary equipment and tools before the test.
- Organizing players through test forms and according to the sequence of each test within the title of the research.
- The researcher photographed all the tests for the sample to ensure the credibility of the work and also for reference when needed.

### **Main research experience:**

The researcher conducted the tribal tests for the research sample, and it was on Saturday and Sunday, 8 and 9/6/ 2021 at 3 pm, with the help of the assistant work team at the Al-Hashmiya Sports Club hall for volleyball for youth. The specific attempts were given to each member of the sample in the tests, and they were all photographed and record the accomplishments achieved. It shall be as follows:

### **Electrostimulation device:**

The researcher adjusted and determined the degrees of stimulation of the players on the first experimental group before starting the exercises for the purpose of knowing the degree of stimulation of each player while working on the stimulation device, i.e. knowing the degree of stimulation of each of the muscles that will be worked on, and determining the strength of the electrical excitation of the muscle according to the degree of endurance of the player, as The electrode is placed on the muscle to be stimulated, then the stimulation process is carried out by gradually increasing the electricity passing through to the muscle through a special button of the device until the muscle is excited so that it does not cause pain to the player, thus determining the degree of stimulation and how to control the stress used. The researcher relied on electrical stimulation by giving doses of stimulation accompanying the motor performance as well as during rest and during exercises, by relying on special exercises, but the researcher relied on stimulating one muscle or group of muscles in each exercise so that the number of stimulating muscle groups was three groups for each training unit, with Giving rest periods between repetitions and between groups, while continuing the process of electrical stimulation during work and rest for the time allotted for each stimulation period. While continuing to perform the exercise for the remaining time, if any, without the device. After completing the tribal tests and setting the electrical stimulation device, the researcher entered the exercises he prepared on the electrical stimulation device and electrical activity within the training program designated for the research sample at the beginning of the main section of the training unit. :

- The date for the start of the exercises was on (Monday) corresponding to 7/6/2021.
- The exercises were applied in the special preparation stage.
- The duration of the experiment was (8) weeks, distributed over (16) training units, at a rate of two units per week.
- The amount of electrical stimulation ranged (6-10 min).

- The end date of the experiment was on (Monday) corresponding to 2/8/2021.

### Post- test

The post test was conducted on the research sample on (Saturday) corresponding to 7/8/ 2021, at the Al Qassem Sports Club stadium in volleyball, with the researcher trying to take into account the same conditions and conditions in terms of time, place and the mechanism of application of the tests, which the researcher followed in the tribal test to obtain the most accurate results .

**Statistical methods:** The search data was processed through the Statistical Package for the Social Sciences (SPSS).

### Presentation and discussion of results:

Table (1) shows the arithmetic means, standard deviations and the calculated (t) value shows the statistical significance of the pre and post-tests of the variables studied for the control group.

No	Muscles and tests	activity indicator	Pre-test		Post-test		T value	Type sig
			Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
1	Right ulnar carpal flexor	top	348.63	69.25	216.88	78.32	2.73	sig
	Left ulnar carpal flexor	top	327.68	57.34	383.45	60.67	5.28	sig
2	Right biceps brachii	top	294.62	48.14	145.16	44.82	8.76	sig
	left biceps brachii	top	228.067	44.04	176.88	38.86	2.38	sig
3	Right triceps brachii	top	389.21	38.26	412.43	49.19	1.87	Non sig
	Left triceps brachii	top	328.06	44.04	374.88	21.81	1.92	Non sig
4	Right scapular deltoid muscle	top	146.67	19.97	172.99	24.28	9.86	sig
	Left scapular deltoid muscle	top	152.12	23.79	196.14	25.92	7.68	sig
5	Right biceps femoris	top	389.22	38.26	441.43	49.19	1.87	Non sig
	Left biceps femoris	top	328.16	44.15	344.88	21.83	0.92	Non sig
6	right rectus femoris muscle	top	467.31	83.98	513.28	59.79	2.57	sig
	left rectus femoris muscle	top	536.76	53.19	587.32	32.76	2.59	sig
7	Right tibialis muscle	top	347.58	35.67	395.52	39.74	1.86	Non sig

	left tibial muscle	top	350.15	23.26	401.11	30.22	2.71	sig
8	right gluteal muscle	top	643.13	43.48	682.22	40.16	3.04	sig
	left gluteal muscle	top	661.31	43.61	747.56	47.55	2.39	sig
9	Explosive ability of the arms		3.15	0.46	3.39	0.36	3.10	sig
10	Explosive ability of the legs		19.92	2.88	22.34	2.46	5.26	sig
11	Accuracy of piking serve		3.45	1.02	4.14	1.25	2.81	sig

### Presentation of the results of the pre-post-tests for the experimental group:

Table (2) shows the arithmetic means, standard deviations and the calculated (t) value shows the statistical significance of the pre and post-tests for the variables studied for the experimental group.

No	Muscles and tests	activity indicator	Pre-test		Post-test		T value	Type sig
			Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
1	Right ulnar carpal flexor	top	374.12	55.95	443.33	63.95	8.16	sig
	Left ulnar carpal flexor	top	368.54	52.76	373.86	58.67	6.21	sig
2	Right biceps brachii	top	310.76	53.85	302.87	58.25	10.34	sig
	left biceps brachii	top	242.94	37.25	374.36	19.64	3.98	sig
3	Right triceps brachii	top	394.57	50.22	462.36	38.63	5.17	sig
	Left triceps brachii	top	330.27	38.21	.48463	19.64	5.27	sig
4	Right scapular deltoid muscle	top	136.23	75.49	162.14	21.12	5.97	sig
	Left scapular deltoid muscle	top	131.76	64.56	146.12	55.37	6.43	sig
5	Right biceps femoris	top	394.58	50.22	580.52	38.63	9.18	sig
	Left biceps femoris	top	338.93	37.29	374.41	19.64	2.99	sig
6	right rectus femoris muscle	top	469.97	84.43	885.18	66.77	4.93	sig
	left rectus femoris muscle	top	526.31	26.65	704.81	85.12	4.37	sig
7	Right tibialis muscle	top	360.91	29.87	572.27	82.85	5.21	sig
	left tibial muscle	top	351.17	36.89	457.24	18.76	15.33	sig
8	right gluteal muscle	top	667.61	28.71	977.81	65.87	4.92	sig



	left gluteal muscle	top	643.58	48.74	951.38	52.06	7.38	sig
9	Explosive ability of the arms		3.18	0.35	3.86	0.18	8.96	sig
10	Explosive ability of the legs		18.84	2.72	24.97	2.10	9.58	sig
11	Accuracy of piking serve		3.22	1.31	6.45	1.47	4.25	sig

**Presentation of the results of the post-tests for the two groups (control and experimental):**

Table (3) shows the arithmetic means, standard deviations, the calculated (t) value and the statistical significance of the post-tests of the studied variables for the two research groups (control and experimental)

No	Muscles and tests	activity indicator	Control Post-test		Experimental Post-test		T value	Type sig
			Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
1	Right ulnar carpal flexor	top	216.88	78.32	443.33	63.95	6.43	sig
	Left ulnar carpal flexor	top	383.45	60.67	373.86	58.67	0.34	Non sig
2	Right biceps brachii	top	145.16	44.82	302.87	58.25	6.44	sig
	left biceps brachii	top	176.88	38.86	374.36	19.64	13.61	sig
3	Right triceps brachii	top	412.43	49.19	462.36	38.63	2.39	sig
	Left triceps brachii	top	374.88	21.81	346.48	19.64	2.90	sig
4	Right scapular deltoid muscle	top	172.99	24.28	162.14	21.12	1.01	Non sig
	Left scapular deltoid muscle	top	196.14	25.92	146.12	55.37	2.45	sig
5	Right biceps femoris	top	441.43	49.19	580.52	38.63	10.46	sig
	Left biceps femoris	top	344.88	21.83	374.41	19.64	3.02	sig
6	right rectus femoris muscle	top	513.28	59.79	885.18	66.77	12.45	sig
	left rectus femoris muscle	top	587.32	32.76	704.81	85.12	3.86	sig
7	Right tibialis muscle	top	395.52	39.74	572.27	82.85	5.77	sig
	left tibial muscle	top	401.11	30.22	457.24	18.76	4.73	sig
8	right gluteal muscle	top	682.22	40.16	977.81	65.87	11.49	sig
	left gluteal muscle	top	747.56	47.55	951.38	52.06	8.67	sig

9	Explosive ability of the arms	3.39	0.36	3.86	0.18	3.50	sig
10	Explosive ability of the legs	22.34	2.46	24.97	2.10	2.44	sig
11	Accuracy of piking serve	4.14	1.25	6.45	1.47	3.59	sig

### **Discuss the results:**

#### **Discussing the results of electrical activity, explosive ability and accuracy of spiking serve in volleyball for the experimental and control group:**

Tables (1), (2) and (3) show the calculated (T) values and the level of statistical significance of the measurement results, which indicates that there is a significant difference between the two groups in the post-test and in favor of the experimental group. The stage where she was able to change the values of muscle activity.

The process of electrical muscle activity (EMG) is a method used to record the currents generated by the muscles and the voltages that appear at the muscle level can be detected by surface or intramuscular electrodes. (Kamen, Gary, 2004).

This means that the time of the systolic transition point between muscle work from counter to contraction takes place relatively faster for the experimental group, and this leads to indicating an increase in the output of the force thrust, as the variable of muscle capacity depends on the work done during the unit time taken to perform and that the product of the muscle capacity obtained The reciprocal work between the working and opposing muscles in the work that the player exerts at the moment of the push must be at a high level of impact because it is the result of the product of the final pushes in the muscles of the body working on the joints of the body contributing to performance. (Hashem Adnan Al-Kilani. 2000)

The researcher attributes the reason for the superiority of the experimental group over the control group in the development of the development of the accuracy of the skill of crush transmission through the use of special exercises and the electrical stimulation device, which is one of the unconventional and modern techniques and training methods that help in developing the motor path of special skills, as it helps to provoke the largest number of Muscle fibers, when the performance is at full speed from the beginning of the movement to its end, and its importance appears as resistance during performance in being a means similar to the motor performance of the skill, and it also helps in the regressive movement to complete the skill performance. (Muhammad Jaber Bariqa' and Ihab Fawzy. 2004)

Giving exercise and electrical stimulation leads to improving the work of sensory receptors (muscle spindles) in the muscles by transmitting sensory nerve signals through the sensory nerve to the brain and increasing their efficiency and ability to work, and this, in turn, improves the brain's work in sending nerve signals to the muscle units involved in muscle work Which is proportional to the strength of the excitation, the more strong and extreme the excitation on the muscles, the more the brain sends nerve signals to participate in the largest possible number of motor units in the muscle to perform the required muscular work and produce the maximum speed for the implementation of sports movements. (Jabbar Rahima Al Kaabi. 2007)

In addition to that, what was included in the applied exercises, which were developed and implemented, taking into account that they are not free from the elements of excitement and suspense, had a positive impact on developing the explosive ability, whether (for arms or legs), as all the exercises performed by the player during the curriculum prepared by the researcher make the player He has the ability to deal with the requirements of the game. (Osama Kamel Ratib. 2000)

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