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## The effect of (TABATA) exercises to developing speed endurance, cardiorespiratory fitness and the performance of the hook punch for young boxers under 19 years

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### Abstract

The study aimed to identify the effectiveness of TABATA exercises in developing speed endurance, cardiorespiratory fitness, and the performance of the hook punch for young boxers, the researchers used the experimental method with an experimental design with a pre- and post-test for the two equal groups (experimental and control) to suit the nature of the research. The research community was identified with 12 boxers of the Karkh Sports Club for the 2021-2022 training season, the research sample was randomly selected by (10) boxers and they were divided into two groups (experimental and control) with five boxers for each group. 2 boxers were used for the pilot experiment. Tabata exercises prepared by the researchers were applied for the period from 10/12/2021 to 15/2/2022. The exercises were carried out during the special preparation period. The load was formed for the rest of the weeks by performing a period of (20 seconds) and worked (10 seconds) rest with a number of repetitions of 5 repetitions and a period of one minute rest between groups. The exercises were applied with intensity ranging between 85 - 90% of the individual's maximum ability high intensity interval training. One of the most important conclusions reached by the researchers is the effectiveness of Tabata exercises in developing speed endurance, cardiorespiratory fitness, and the performance of hook punches for young boxers.

**Keywords:** (TABATA) exercises, endurance speed, cardiorespiratory fitness

### Introduction

Sports games, including individual games, have become one of the modern manifestations that reflect the state's progress and advancement. The Olympic, international, continental and local meetings are forums in which the splendor of physical performance is manifested in the formulation of motor skills and tactical sentences in their best forms. The numbers that are recorded and the levels that have become a living embodiment of the human ability to perform what Some thought it was difficult. Boxing is one of the games in which the anaerobic (lactic) energy system is prevalent in a high percentage, and this is an indication that during the rounds there will be an accumulation of lactic acid in large quantities, so the players must bear this accumulation in the muscle and blood and the player should not stop working and get tired early, this does not come to safety during the exercises affecting the concentration of lactic acid through modern training methods, including Tabata exercises, so that the player can resist fatigue resulting from the accumulation of lactic acid and thus maintain the speed of performance for the longest possible period during the training competition. Most of the boxing skills are open skills in which the competitor is not fixed, which requires the boxer to realize and care about the speed of movement and the accuracy of the skill, which made the researcher need to choose the best methods for the purpose of reaching the optimal performance of her various skills, including the hook punch. Tabata exercises are among the modern exercises that are of great importance in improving the efficiency of both muscular and respiratory work and through the exchange between the period of maximum effort and the period of rest, which is one of the fastest and most influential in endurance speed and cardiorespiratory fitness because it directly affects the heart muscle and blood vessels for short periods of great and high efforts that follow rest times.

By continuing to perform frequent, high-intensity exercises gradually, the body adapts to these exercises and improves its performance in them. These exercises increase the body's ability to consume oxygen, breathe quality, lung strength, and its ability to receive and distribute oxygen to the body, and this is reflected in improving metabolism and burning calories. present in the body. All of this is worthy of study and research, and thus the importance of research is demonstrated through the preparation of Tabata exercises in developing speed endurance, cardiorespiratory fitness, and performance of the hook punch for young boxers under 19 years of age.

### Research problem

Boxing is one of the sports that is characterized by high physical and technical performance due to the multiplicity of skills and their overlap with each other when playing and competing and by informing the researchers that they are former players of this game and by following up on the training units of many clubs for the game of boxing, note that there is a clear decrease in the level of performance of important punches, including the hook punch, specifically in the final rounds of competition, which negatively affects the performance of the boxer and the reasons may be due to a decrease in the level of physical and physiological abilities, including cardio-respiratory fitness or not giving it enough time in training units and lack of focus to training it. Therefore, the researcher prepared Tabata exercises to identify their impact on speed endurance, cardiorespiratory fitness, and the performance of the hook punch for young boxers.

### Research objective

Recognizing the effectiveness of TABATA exercises in developing speed endurance, cardiorespiratory fitness and the performance of the hook punch for young boxers aged under 19 years

### Research hypothesis

There is a positive effect of TABATA exercises in the development of speed endurance, cardiorespiratory fitness and the performance of the hook punch for young boxers under 19 years of age.

### Research fields

**The human field:** Al-Karkh Sports Club players for the youth category under 19 years of age for the 2021-2022 training season.

**Time field:** From 10/12/2021 to 15/2/2022.

**Spatial field:** Indoor and boxing ring of Al-Karkh Sports Club.

### Research methodology and field procedures

#### Research Methodology

The researchers used the experimental method in an experimental design with a pre- and post-test for the two equal groups (experimental and control) for its suitability to the nature of the research.

#### Community and sample research

The research community was identified with young boxers in Al-Karkh Sports Club under 19 years of age for the 2021-2022 training season, and they numbered 12 boxers. The research sample was randomly selected by (10) boxers and they were divided into two groups (experimental and control) and five boxers for each group. 2 boxers were hired for the pilot experiment.

#### Homogeneity and equivalence of the sample

To complete the requirements of the experimental design followed and to control the variables that affect the results of the research, the researcher verified the homogeneity and equivalence of the research sample members in length, mass, chronological and training age, and dependent variables using the Leven test as shown in Tables (1, 2).

**Table 1:** Shows the homogeneity of the sample

N	Variables	Measuring unit	(Leven) test value		Sig type	Type
			Calculated	Standard error		
1	Age	Year	1.453	0.783	Non sig	Homogeneity
2	Training age	Year	1.756	0.798	Non sig	Homogeneity
3	Mass	Kg	1.492	0.562	Non sig	Homogeneity
4	Length	Cm	1.777	0.334	Non sig	Homogeneity

**Table 2:** It shows the means, standard deviations, the calculated (t) value, and the differences significance in the investigated tests between the control and experimental groups in the pre-test.

Variables	Unite	Experimental		Control		T value	Percentage error	Sig type
		Mean	Std. deviation	Mean	Std. deviation			
Cardiorespiratory fitness	ml/kg min	36.995	1.590	37.403	1.306	0.608	0.518	Non Sig
Endurance speed	Second	40.493	1.832	39.884	1.228	0.912	0.373	Non Sig
Right hook punch	Degree	3.36	0.123	3.53	0.157	1.342	0.123	Non Sig
Left hook punch	Degree	4.88	0.558	3.99	0.448	1.783	0.194	Non Sig

\* Significant at the significance level (0.05) if the error level is less than (0.05).

It is clear from the previous two tables (1,2) that the random differences between the control and experimental groups in the variables under investigation are at the significance level (0.05) and at the degree of freedom (8), as all levels of error appeared greater than (0.05), which indicates homogeneity and equivalence My research groups in the tests in question.

### Means, devices and tools used in the research

- A computer type (HP) of Chinese origin.
- A digital camera (Canon) of Chinese origin with 250

images/sec.

- Electronic scale for measuring weight, type (Sartorius) of German origin, number (2).
- Chinese-made electronic stopwatch (2).
- Leather measuring tape with a length of 25 m.
- Plastic poles (12) of different heights.
- Wooden platform with a height of 50 cm and a length of 2 m, number (2)
- Fox type whistle (3).

- Agility ladder with a length of 6 m, number (2). Each ladder has ten squares.
- Plastic circular collars (8).
- Tread mill.
- Four (4) medical balls, weighing (2) kg.
- 12 Chinese-made boxing gloves.

### Field research procedures

#### Tests used in the research

**First: Measuring cardiorespiratory fitness with the Fitmate Pro device and how to use it in measuring  $VO_2\max$ :** (Sajit, Hussein Manati, 2019, p. 111) <sup>[1]</sup>

#### Equipment and tools used in the test

- The device system (Fitmate Pro).
- A stationary bike type (life fitness) with a capacity of (9700) American (orbital hand and leg) mechanical with a screen to monitor the speed and install the resistance of each tester.
- Dry sanitary paper to clean breathing masks.
- Disinfectant solution to sterilize breathing masks.
- A personal electronic scale with a unit of measurement (kg) and its parts.
- An iron tape to measure the length in a unit of measurement (cm) and its parts.

#### Procedures and performance specifications

Before the test begins, the test performer cleans the  $VO_2\max$  respirator with disinfectant solution, connects the parts of the Fitmate pro system together, installs a pulse belt on the tester's chest, and installs the pulse signal receiver (Bluetooth) in the Fitmate pro. After entering the laboratory's information into the device, which includes the name, date of birth, gender, height, and weight, and choosing the type of test to be performed, which is ( $VO_2\max$ ) because the system contains several tests, and then fixing the breathing mask tightly with its belts and making sure that breathing air does not leak from the mask, Then the tester climbs on a stationary bike device with leg and hand propulsion (orbit), and the laboratory works gradually with increasing speed, as the test-taker begins to instruct the control to increase the speed of work on the device by gradual speed by order and monitor it starting from (2.5) to (7) km/h, in this way, it differs from the treadmill by setting the speed and by engaging the muscles of the body to work during the performance. The (Fitmate Pro) contains a small screen with a square graphic showing the pulse and the maximum oxygen consumption ( $VO_2\max$ ) with the ratios of each of them, where they are monitored by the evaluator.

#### Conditions

1. The tester must be in the normal state before the test begins, and his maximum pulse must be known from the well-known equation (220-age in years) in order to gradually progress and stabilize the pregnancy.
2. Attention should be paid to increasing the gradient of the load by controlling the speed, and monitoring the tester when reaching the state of exhaustion of effort or based on the tester's request that he is unable to continue.
3. It accepts the readings of the Fitmate pro device when the tester reaches (85%) or more of the maximum pulse.

#### Register

The Fitmate Pro device gives a comprehensive reading tape for measurements of the maximum oxygen consumption ( $VO_2\max$ ) in milliliters / kg / min, and compares it with the

objective standard issued by the device to know the rate of improvement of the individual.

#### Second: Speed Endurance Test

**Test name:** The apostate ran test (180) meters from the standing position: (Abdul-Tarifi, Ali Salman, 2013, pg. 76) <sup>[2]</sup>

**Objective of the test:** To measure the endurance of speed.

**Equipment:** stopwatch, four pointers, distance between one person and another (15) m, tape measure, whistle.

**Performance description:** After giving the start signal (the whistle), the player will start from the first person (the start) to the second person and return to the start and run towards the third person and return to the start, then run towards the fourth person and return to the start, thus the player has completed the test.

**Test instructions:** in groups, taking into account harmony, and the player is given one attempt

**Recording method:** Calculates the time taken and records the nearest 1/100 second.

#### Third: Measurement of the investigated punches (performance evaluation):

The researcher visualized the performance of the right hook punch and the left hook punch through a one-round fight and put it on (CD) and presented it to the evaluators for the purpose of putting the score out of (10) according to a form prepared for this purpose.

#### Experience Exploratory

The researchers conducted the exploratory experiment on a sample of (2) boxers on 5/12/2021 at three in the afternoon in the Karkh Sports Club Hall. The exploratory experiment indicated that the researchers identified:

1. The validity of the devices and tools used in the research.
2. The time taken to conduct the tests.
3. To identify the difficulties that the researcher may encounter when conducting the main tests.
4. Rationing the training intensity for the exercises used in the research

#### Pre-test

The researchers conducted the tribal tests on 7/12/2021 at exactly three o'clock in the afternoon in the Karkh Sports Club hall after giving the researchers a brief explanation of how to perform the tests and the purpose of conducting them, then taking measurements of height, weight, chronological and training age, and then conducting skill and physical tests on the research sample.

#### Main experience

The Tabata exercises prepared by the researchers were applied for the period from 10/12/2021 to 10/2/2022. The details were as follows:

1. The exercises were carried out during the special preparation period.
2. The researcher determined the number of weekly training units by two training units on days (Sunday - Tuesday) with a total of 16 training units.
3. Part of the main section of the training unit was used, specifically the beginning of the main section.

4. The pregnancy cycle for the first and second weeks was formed by performing a period of (20 seconds) work and (10 seconds) rest after iterations of 5 times and a rest period of one minute between groups.
5. The duration of the exercises in one training unit (24-30) minutes.
6. The intensity used ranges between 85-90%.
7. The training method used is high-intensity interval training.

### Post-test

The post tests were conducted on 20/2/2022 at 3:00 pm in the Karkh Sports Club Hall, the researchers took into account the provision of conditions similar to the tribal tests in terms of

(time, place, tools used and the method of conducting the tests).

**Statistical methods used in the research:** The researchers used the statistical package (SPSS) to find the appropriate statistical treatments.

### Presentation, analysis and discussion of the results

**Presenting the results of the experimental and control groups in the investigated variables, their analysis and discussion**

**Presenting the results of the differences between the pre and post tests of the experimental group in the investigated variables and their analysis**

**Table 3:** It shows the difference of the means, its standard deviation, the value of (t) and the differences significance between the results of the pre- and post-tests of the experimental group in the variables under investigation.

Variables	Unite	Pre-test		Post-test		T value	Percentage error	Sig type
		Mean	Std. deviation	Mean	Std. deviation			
Cardiorespiratory fitness	ml/kg min	36.995	1.590	44.978	3.856	7.994	0.000	Sig
Endurance speed	Second	40.493	1.832	33.892	2.896	8.932	0.000	Sig
Right hook punch	Degree	3.36	0.123	7.454	1.998	11.756	0.000	Sig
Left hook punch	Degree	4.88	0.558	8.998	1.435	12.768	0.003	Sig

\* Significant at the significance level (0.05) if the error level is less than (0.05)

Table (3) shows that the level of error ranged between (0.00 to 0.003) for all research variables, which is less than (0.05), which indicates the significant differences between the pre and post tests at the level of error (0.05) in front of the degree

of freedom (4) and in favor of the post test.

**Presenting the results of the differences between the two tests, the pre and post tests of the control group, in the variables investigated and their analysis**

**Table 4:** It shows the difference of the means, its standard deviation, the (t) value and the significance of the differences between the results of the pre and post tests for the control group in the variables under study.

Variables	Unite	Pre-test		Post-test		T value	Percentage error	Sig type
		Mean	Std. deviation	Mean	Std. deviation			
Cardiorespiratory fitness	ml/kg min	37.403	1.306	38.421	3.231	11.543	0.000	Sig
Endurance speed	Second	39.884	1.228	37.782	4.673	7.893	0.000	Sig
Right hook punch	Degree	3.53	0.157	4.897	1.453	9.998	0.031	Sig
Left hook punch	Degree	3.99	0.448	5.231	1.435	11.745	0.038	Sig

\* Significant at the significance level (0.05) if the error level is less than (0.05).

Table (4) shows that the level of error ranged between (0.000 to 0.038) for all research variables, which is less than (0.05), which indicates the significant differences between the pre and post tests at the level of error (0.05) in front of the degree

of freedom (4) and in favor of the post test.

**Presenting the results of the differences between the two post tests of the control and experimental groups in the variables investigated.**

**Table 5:** The value of (t), the level of error, and the significance of the differences between the results of the post-test for the two experimental and control groups in the variables under study.

Variables	Unite	Experimental		Control		T value	Percentage error	Sig type
		Mean	Std. deviation	Mean	Std. deviation			
Cardiorespiratory fitness	ml/kg min	44.978	3.856	38.421	3.231	13.954	0.000	Sig
Endurance speed	Second	33.892	2.896	37.782	4.673	11.889	0.000	Sig
Right hook punch	Degree	7.454	1.998	4.897	1.453	7.894	0.000	Sig
Left hook punch	Degree	8.998	1.435	5.231	1.435	9.994	0.000	Sig

\* Significant at the significance level (0.05) if the error level is less than (0.05).

Table (5) shows that the level of error was (0.00) for all research variables, which is less than (0.05), which indicates the significant differences between the post-tests at the level of error (0.05) in front of the degree of freedom (8) and in favor of the experimental group.

### Results Discussing

Table (5) shows the results of the tests and dimensional measurements of the two groups (control and experimental),

and the results showed that there are significant differences between the control and experimental group and in favor of the experimental group in the cardiorespiratory fitness variable. The researchers believe that the reason for the superiority of the experimental group over the control group, due to the nature of the exercises that were applied to the research sample, (tabata) exercises led to an increase in the burden on both the circulatory and respiratory system and thus sought to develop and increase the efficiency of the

circulatory and respiratory system and increase the energy houses within the muscle fibers, which was reflected in the muscle's ability to consume oxygen from blood and work to burn many calories, according to the American College of Sports Medicine (ACSM), Tabata exercises not only burn more calories, but also work on faster developments in the heart and blood vessels through high-intensity exercises with short rest periods. (Al Abdullah, Jamal Sabri Faraj, 2019, p. 309) <sup>[3]</sup>.

"VO2max is the physiological measurement and the key to cardiorespiratory and vascular fitness and can help clarify the differences in achievement between athletes, and it tells us about the maximum amount of oxygen that our bodies are able to consume when training, so it is affected by a number of factors, including the ability of the lungs to absorb greater The amount of oxygen, the ability of the heart and the circulatory system, and the ability of the working muscles to consume the largest amount of oxygen". (Al Abdullah, Jamal Sabri Faraj, 2019, p. 203) <sup>[3]</sup>.

There is also a group of studies conducted in the United States of America "confirming that regular (tabata) exercise affects the blood vessels like the effect that is affected by drug use, which confirms that sport has an effective and significant role in developing the efficiency of the respiratory system and reducing the incidence of blood pressure and cholesterol concentration in blood, which negatively affect the health of the heart. (Barry L. Zaret, Genell J. Subak-Sharpe, 2006, P. 76) <sup>[4]</sup>.

There is no doubt that commitment to training and regularity in it will lead to physiological changes in all functions of the body's systems, especially the circulatory and respiratory system. which depend on the use of oxygen and are characterized by endurance sports, to a number of physiological changes that express the efficiency of breathing processes in athletes, and their adaptation to sports training compared to individuals who do not exercise, and among these adaptations are the improvement of the strength and efficiency of the breathing muscles, especially the muscles between the ribs and the diaphragm muscle, so the size of the rib cage increases in breadth and flexibility during the process breathing, this allows for a better performance of respiratory processes in people who are athletes, and in particular for physical exertion". (Sajit, Hussein Manati and Ali, Ahmed Farhan, 2017, p. 212) <sup>[5]</sup>.

Table (5) shows the results of the tests and dimensional measurements of the two groups (controller-experimental), and the results showed that there are significant differences between the control and experimental group and in favor of the experimental group in the variable endurance of speed. By the researcher (tabata) method, which was done at relatively medium distances and with few rest periods, and this is consistent with (Jamal Sabry 2019) that endurance of speed can develop through training or sprinting for short distances (10-35 m) and giving short rest periods (10-30 seconds) between iterations". (Al Abdullah, Jamal Sabri Faraj, 2019, p. 252) <sup>[6]</sup>.

This is what the researcher sought in the application of most of his exercises. The researchers suggest that the improvement is due to the commitment and regularity of applying exercises throughout the training program if the training is for two units per week for a period of (10) weeks, as (Chad Waterbury) believes that "a good coach is the one who delves into training the players to a far level in the body and what is known about cell training. And the development or improvement of what happens in it, and it is the one who

works on the continuous change of the conditions of the training environment to bring the players to the physiological adaptations necessary to face the various conditions. (Chad Waterbury, 2005, P: 112) <sup>[7]</sup>.

And (Jack) believes that "developing the level of special physical abilities and delaying the onset of fatigue is one of the important things that every coach seeks to achieve and every player tries to reach, as the emergence of fatigue is a problem that negatively affects physical performance and skills". (Jack Wilmore, *et al.*, 2008, P.20) <sup>[8]</sup>.

Table (5) shows that there is an improvement in the skill performance of the right and left hook punch in favor of the experimental group. The researchers attribute the reason for this to the commitment to exercise and perseverance by the research sample, as the auxiliary tools and exercises prepared (tabata) provided interesting methods and incentives to ensure adherence to training units and completion of the curriculum Those methods created motives that make the boxer feel joy, pleasure and excitement, which makes him rush towards the exercise that achieves the goal to be achieved, as "good exercise and practice through performance leads to an increase in the athlete's awareness of his body, as well as the importance of developing knowledge in the athlete through thinking as it penetrates the body." The essence of movement, which is based on the tightness of experiences that are stored in memory". (Al-Talib, Nizar & Al-Ways, Kamel, 1993, p. 167) <sup>[9]</sup>.

## Conclusions and recommendations

### Conclusions

1. The results showed a marked superiority between the tribal and remote measurements in (speed endurance) for the players of the experimental group and in favor of the post measurement.
2. The results showed a marked superiority between the tribal and remote measurements in (cardiorespiratory fitness) for the players of the experimental group in favor of the post measurement.
3. The experimental group outperformed the control group in the dimensional measurement of the variables investigated and in favor of the experimental group

### Recommendations

1. The necessity of adopting the exercises used (TABATA) when training young boxers on offensive and defensive skills in boxing.
2. The need to focus on developing the right and left hook punch because of its importance in winning the fight.

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### Appendix (1)

The exercises used in the research

1. Stand in front of the punching bag and perform a straight punch, left and right, directed at the head, using pulling the torso back (applied with the colleague).
2. Standing in front of the punching bag and performing compound exercises to combine attack with defense with counter punches.
3. Playing free kick boxing using the left hook and its defenses only.
4. Playing free kick boxing using the right hook and its defenses only.
5. Defensive offensive compound exercises for right hook punches (application with a colleague).
6. Defensive offensive compound exercises for left hook punches (application with a colleague).
7. Boxing No. (1) Throws a right hook punch to the face of

Boxer No. (2) Boxer No. (2) gets rid of by leaning to the left.

8. Boxing No. (1) directs a left hook punch to the face of Boxer No. (2) Boxer No. (2) gets rid of by taking a step with the legs back.
9. Boxing No. (1) directs a right hook punch to the face of Boxer No. (2) Boxer No. (2) gets rid of by pulling the torso back and directing a straight punch against the right of the boxer (1).
10. Boxing No. (1) is eliminated by leaning to the left side and directing a right counter punch to the boxer's torso (2).
11. Boxer No. (2) gets rid of by pulling the legs back (taking a step back) and pushing a punch down.
12. Defensive offensive compound skill exercises / counter punches (application with a colleague).
13. Playing freestyle boxing using hook punches, types of defense and counter punches (1) round.
14. offensive / defensive / counter punches (application with a colleague)

### Appendix (1)

A model of a training unit for Tabata exercises used on the experimental research sample

Training unit: first and second.

Week: first

Place: Karkh Sports Club Hall.

Time: 3 pm

Objective: To improve the cardiorespiratory fitness and performance of the hook punch for young boxers

Units	Exercises	Intensity	Repetition time	Repetition	Rest between repetitions	groups	Rest between groups	Total exercise time
First	Second	%85	15 second	8	15 second	1	-	4 minute
	Eleventh	%90	15 second	8	15 second	1	-	4 minute
	Fifth	85%	15 second	8	15 second	1	-	4 minute
second	Third	%85	15 second	8	15 second	1	-	4 minute
	Ninth	%90	15 second	8	15 second	1	-	4 minute
	Fourth	%85	15 second	8	15 second	1	-	4 minute