Vol 2 Issue 4 Thi Qar University Journal of Physical Education

مجلة جامعة ذي قار لعلوم التربية البدنية

مجلة علمية محكمة تصدرها كلية التربية البدنية وعلوم الرياضة

The Effectiveness of High-Intensity Interactive Training in Developing Muscle Ability and Offensive Performance in Taekwondo Players for Youth

Khalid Mahmoud Ahmed
Al-Mustansiriya University / College of Political Sciences
Khma537gmail.com.edbs@uomustansiriyah.edu.iq

ABSTRACT

Published online:
20/ 12/2025

This research aims to evaluate the effectiveness of high-intensity interactive training as a specialized training approach in developing two vital aspects in young taekwondo players (14-16 years old), where the research focuses on muscular ability, which includes explosive power, the ability to repeat maximum efforts, and anaerobic endurance, in addition to specific offensive performance in the sport of taekwondo, such as the speed and effectiveness of blows and kicks, the ability to launch consecutive attacks, and the accuracy of performance under pressure. The research proceeds from the hypothesis that the nature of high-intensity interactive training, which is characterized by short and intense work periods followed by short incomplete breaks, simulates the physiological and dynamic requirements of taekwondo matches that require repeated bursts of strength and speed, since the youth group (14-16 years) is characterized by greater physiological maturity and a higher ability to adapt to intense training loads compared to younger age groups, the application of this type of training is expected to lead to advances remarkable in their specific physical abilities, which in turn will reflect positively on their ability to implement offensive techniques more effectively and more consistently during competitions, and the research includes one experimental group subject to a high-intensity interactive training program, pre and post measurements of muscular ability and offensive performance will be made using reliable and specific tests and measures for the sport of taekwondo, in order to evaluate the changes that occur after the implementation of the training program. The most important expected conclusions, a remarkable development in muscular ability and also a positive development in offensive performance, training efficiency: The research will show that high-intensity interactive training is considered an effective and time-efficient training method, which allows to achieve important training gains in a relatively short period of time, and the most important recommendations are: It is recommended that scientifically designed interactive high-intensity training programs be incorporated into the training plans of young taekwondo players, to enhance their specific physical abilities and offensive performance.

Keywords:
High-intensity Interactive Training , Muscular Ability , Offensive Performance , Taekwondo

1- Introduction to the Research:

1-1 Introduction and Importance of the Research:

In the competitive world of taekwondo, where the pace of the fight is accelerating and the confrontations are intensifying, effective offensive performance stands out as a pivotal element in deciding the results and achieving victory. The ability of a player to launch fast, powerful and sophisticated attacks is not just a technical skill, but a reflection of integrated physical abilities that allow him to penetrate the opponent's defenses and score decisive points. In the youth category Specifically, which is the real gateway to future stars, experts and coaches note a noticeable lack of effectiveness in the performance of some offensive styles during matches, this deficiency is manifested in the player's inability to achieve the required breakthrough or his strokes reach their goals, which limits the chances of winning and raises questions about the reasons for this weakness. This challenge is largely due to the lack of development of the muscular capacity needed to support the explosive and offensive performance required in taekwondo. It is the ability to generate maximum force in the shortest possible time, which is known as explosive power, which is the essence of crucial kicks and punches in this sport, andmuscular ability is one of the most important components of physical fitness for motor performance in the sport of taekwondo, and it is a kinetic component that results from the link between muscular strength and speed, and physical education experts emphasize that the connection and compatibility between muscular strength and motor speed is considered one of the requirements of sports performance at high levels and that ability Muscularity is one of the most important characteristics of elite athletes.

Hammad (2010, p. 55) adds that the link between muscular strength and motor speed in the muscles is considered one of the performance requirements and that this factor is the most important characteristic of outstanding athletes, as they possess a great deal of strength and speed with the ability to link them in an integrated form to create a fast and powerful movement, and in addition, muscular ability is one of the most important physical abilities that contribute to the category of fighting (croquet) in taekwondo. As it is one of the most important factors of motor performance that greatly affect the speed of performance, which is reflected in the quality of the skill and planning performance, and thus the efficiency and effectiveness of the player increases during competitions, when the focus is not on developing this ability optimally, offensive methods lose their effectiveness and impact, hence, the utmost importance of this research is manifested, as it seeks to provide a systematic solution to this problem by exploring the effectiveness of high-intensity interactive training. This innovative training style is characterized by the Also known as cluster training in some contexts, it is known for its unique ability to maximize quality in each repetition, instead of performing a full set of repetitions until exhaustion, it allows repetitions to be divided into small "clusters" separated by very short breaks. Its core advantage is to maintain a high level of strength and speed in every movement, reducing fatigue build-up and enabling muscles to partially recover, ensuring continuous explosive performance. These properties make it ideal for developing neuromuscular responses and increasing maximum strength and speed in the explosive movements required by taekwondo attacks. Therefore, it is expected that this training style will directly contribute to the development of basic muscular ability, thus enhancing the offensive performance of young taekwondo players , enabling them to implement their offensive methods more effectively, easily penetrate the opponent's defenses , and achieve better results in competitions. for coaches and stakeholders, in

a way that contributes to raising the level of performance of future generations of taekwondo athletes.

1-2 Research Problem:

Despite the pivotal importance of offensive performance in the sport of taekwondo, which is a decisive factor in achieving superiority and points, field observations and preliminary studies indicate that there is a clear deficiency in the effectiveness of the performance of offensive methods among a number of taekwondo players within the youth category during competitive matches, this deficiency is embodied in the players' inability to penetrate the opponent's defenses effectively, and their attacks (such as kicks and punches) do not reach their intended goals repeatedly and effectively, which This problem is mainly attributed to the weakness or inadequacy in the development of muscular ability, specifically explosive power and muscular speed, which is the physiological basis for generating sufficient and rapid force needed to implement complex offensive methods in taekwondo. Despite the existence of general training programs, there seems to be a gap in the adoption of specialized training methods that target these abilities directly and intensively, which loses the offensive performance of the players From this point of view, the current research problem is determined in determining the effectiveness of high-intensity interactive training in developing the muscular ability and explosive power needed to enhance offensive performance, improve the ability to penetrate the opponent's defenses among young taekwondo players , and find out whether the application of this type of training can represent a practical and effective solution to this existing problem.

1-3 Research Objective:

The research aims to study the effect of high-intensity interactive training on the development of muscular ability, speed of foot movements, and the effectiveness of performing some offensive methods for young people in Taekwondo.

1-4 Research Hypotheses:

In order to guide the work in the research procedures and in pursuit of its goal, the researcher assumed the following:

1- There are statistically significant differences between the pre- and post-measurements in muscular capacity and foot movement speed in favor of telemetry.

2- There are statistically significant differences between the pre- and post-measurements in the effectiveness of some offensive performance in favor of telemetry.

1-5 Research Terms:

● High-intensity reactive training: It is a training style characterized by short, repetitive periods of very high-intensity exercise followed by breaks or low-intensity exercises for active or passive recovery. ((Wilmore et al., 2008,p.135

● Muscular Ability:

It is the ability of the muscle to overcome resistances that require a high degree of rapid muscle contractions. (Carneiro et al., 2020, p. 260)

1-6 Research Areas:

1.6.1 Human Field: For the Municipality Sports Club.

1-6-2 Time Range: For the period from (22/6/2024) to (28/9/2024).
1.6.3 Spatial Area: Al-Amana Sports Club Hall.

2. Research Methodology and Field Procedures:

2-1 Research Methodology:

The researcher used the experimental method by following the experimental design of a single experimental group using

Pre- and post-measurements.

2-2 Research Population and Sample:

The research population is represented in the category of youth for the combat event (corki) in the sport of taekwondo (14-16 years old) in Baghdad, and the total population of (22) athletes from the youth category, who are registered in the Iraqi Taekwondo Federation for the season (2023/2024), and the basic research sample was selected by the deliberate method and included (14) players from the club Sports housing, in addition to (8) players from the same research community and outside the basic research sample to conduct the survey study and scientific transactions, and Table (1) shows the description of the research sample, and the following conditions were taken into account when selecting the research sample, which are represented in the following:

1- The members of the research sample were selected from the juniors of the combat category (crook), registered in the Iraqi Federation

For Taekwondo.

2- The members of the sample under study are homogeneous in chronological and training age, physical, skillful and planning levels.
3- The availability of training venues as well as devices and tools with the safety of the research sample members from injuries.

Table (1)

Research Sample Description

Survey Sample		Basic Research Sample		Total Research Sample	
Percentage	Number	Percentage	Number	Percentage	Number
36.36 %	8	63.64 %	14	100 %	22

It is clear from Table (1) that the total research sample reached (22) for Aab from the youth category, and the number of the main sample for the research reached (14) for Aab, with a percentage of (63.64%), and the number of the survey sample reached (8) for Aab with a percentage of (36.36%).

The researcher found the moderation of the distribution of the research sample members in growth rates, training age, muscular capacity, speed of foot movements, and the effectiveness of some offensive methods under study, and Table (2) shows this.

Table (2)
The Moderate Distribution of Research Sample Members in Growth Rates, Training Age and the Variables Under Study

Torsion	Standard deviation	Broker	Arithmetic Average	Unit of Measurement	Variables	
- 0.46	0.65	13.3	13.39	Year	Age	
- 0.58	3.11	167	166.43	Poison	Length	
- 1.3	3.28	65	63.20	kg	Weight	
- 0.14	0.75	7	6.53	Year	Training Age	
- 0.24	5.2	202	201.3	Poison	Horizontal muscular capacity	
- 0.14	1.46	24	23.67	Poison	Vertical muscular capacity	
0.3	0.2	3.1	3.75	meter	Muscular Capacity of the Arms	
- 0.20	1.16	10.3	10.66	Number	Right	Muscle capacity for the legs
0.77	1.06	11	11.24	Number	Left	
0.80	1.05	16	16.21	Number	Right	Muscle capacity specific to the arms
- 1.11	1.15	15	14.27	Number	Left	
0.4	0.04	2.45	2.47	Second	Foot movements from step forward	Foot movements
- 0.5	0.03	3.1	3.9	Second	Foot movements from step back	
- 0.5	0.03	3.45	3.44	Second	Lateral foot movements outward	
- 0.88	0.05	3.13	3.11	Second	Lateral inward movements of the feet	
- 1.11	0.06	3.42	3.39	Second	Movements of the diagonal feet to the right	
- 1.2	0.04	3.24	3.22	Second	Movements of the diagonal feet to the left	
0.04	2.55	50	50.05	%	:(Seon-gong)Pre-Attack/ First Initiative	Methods of Attack
- 0.1	1.45	35.5	35.40	%	(Dongsi Gonggyeok): Simultaneous Attack/Attack at the Same Time	
- 1.9	2.47	45	43.93	%	(Hu-gong): After-Attack/Counter-Attack	

It is clear from Table (2) that all the values of the torsion coefficients, growth rates, training age, and the tests under study ranged between (-1.3) (0.77), i.e., they are limited to (±3), which indicates the moderate distribution of the research sample members in these variables.

2.3 Means of data collection:

2.3.1 Instruments and devices used in the research:

- Rastameter device to measure the total length of the body in centimeters.
- Calibrated medical scale to measure weight in kilograms - tape measure. - Set of cones
- Rubber stick set stop clocks. - Ground kicking bag.
- Sponge rackets (mat training). Triple camera mount. - Laptop computer.
- Adhesive tags – divided boxes. - Weights of different weights. - Resistance training devices. - A set of rubber sticks. Digital video camera.

2.3.2 Tests and measurements under research:

A-Physical tests under research:

1- Wide jump test of stability to measure the horizontal muscular capacity of the legs. (Muhammad Hassan Allawi and others: 2002: 76-78).

2- Vertical jump test to measure the vertical muscular capacity of the legs. (Abul-Ela, 2005, p. 120).

3- A medical ball push test weighing (3) kg to measure the muscular capacity of the arms. (Baechle & Earle, 2008, p. 250).

4- Front/side circular kick skill (Dollyo Chagi), Dollyo Chagi. For 10 seconds right-left. (Lee, 2006,p.85).

Test Description: Duluio Chaji is the most common kick and equivalent of Mawashi Jiri in Taekwondo. A circular kick that uses the metatarsal or the back of the foot (depending on the technique) to hit the target.

● Description of the test method:

- Objective: To measure the ability to perform the repetitive Duluo Chaji kick quickly and accurately.
- Action: The player performs the Duluo Chaji kick on the target (such as a kicking pad or dead) at the highest possible speed and with the maximum number of repetitions within 10 seconds, alternating between the right and left legs or performing each leg individually.
- Measurement: The number of correct kicks that touch the target with appropriate force.

5- Straight Punch Skill Test (Jumeok Jireugi or Baru Jireugi) for (10) seconds "Right - Left" to measure the special muscular capacity of the arms.

● Test Method Description :

- Objective: To measure the ability to perform the repetitive Pandee Gerouji punch with strength and speed.
- Action: The player performs the Pandee Gyroji punch on the target (such as a punching pad or punching bag) at the maximum possible speed and force within 10 seconds, alternating between the right and left hand or performing each hand individually.
- Measurement: The number of correct punches that touch the target with the correct force and body position.

B- Tests for the speed of movement of the feet under research:

1- Test the movements of the feet from step forward.

2- Test the movements of the feet from step backwards.

3- Test the lateral movements of the feet outwards.

4- Test the lateral movements of the feet inwards.
5. Test the movements of the diagonal feet to the left.
6. Test the movements of the diagonal feet to the right.

- General notes before starting the tests:
- Location: A flat, well-defined space (e.g., a training yard).
- Tools: Adhesive tape to mark lines, or small cones, stopwatch.
- Primitive Mode: The player always starts from combat standby or natural standby mode, as directed by the coach, with a readiness to move.
- Measurement: Typically, the time it takes to complete a certain number of repetitions, or the number of correct repetitions over a specific period of time (e.g., 10 or 15 seconds) is measured.

1. Testing the Foot Movements from Stepping Forward: (Bridge & Jones, 2014, p. 112).

- Objective: Measure the speed of moving forward while maintaining balance and combat posture.
- Preparation: Draw a starting line. Another line can be drawn forward with a certain distance (e.g. 1-2 meters) or a funnel can be used.
- Action: The player stands on the starting line in combat standby.
- At the start signal, the player quickly steps/slides forward, with the back foot following to reach a new balanced combat mode (or reaching the front line), the player returns in the same way to the starting line.
- The movement is repeated back and forth for a certain number of times (e.g., 5 repetitions) or for the maximum number possible during a set time (e.g., 10 seconds).
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

2. Test the movements of the feet from stepping backwards:

- Objective: Measure the speed of moving backwards while maintaining balance and combat mode.
- Setup: Same as the step forward test setting, with a focus on backward movement.
- Action: The player stands on the starting line in combat standby.
- At the start signal, the player quickly steps/slides backwards, with the front foot following to reach a new balanced combat position (or returning to the designated back line), the player returns in the same way to the starting line.
- The movement is repeated back and forth for a certain number of times or for as many times as possible within a set time.
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

3. Testing the lateral movements of the feet outwards :

- Objective: Measure the speed of lateral movement (away from the center) while maintaining balance.
- Setup: Draw a central line. Draw two parallel side lines at an equal distance from the center line (e.g. 1-1.5 meters per side).
- Action: The player stands on the center line in combat standby.
- At the start signal, the player moves by stepping/sliding sideways to one of the sidelines (e.g. right).

Once the outside foot touches the sideline, the player returns to the center line.

- Repeating the movement to the other sideline (left), the movement is repeated for a certain number of times (right-center-left-center is considered two repetitions) or for as many as possible within a specific time.
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

4. Test the lateral movements of the feet inwards:

- Objective: Measure the speed of lateral movement (toward the center or narrow the distance) while maintaining balance.
- Setting: The same side test setting can be used outside, but with a focus on movement Narrow the distance or return to a central point. Or a converged funnel can be used.
- Action: The player stands in a combat position, with a certain distance between the feet (or between the player

and suppression), at the start signal, the player moves the front or back foot inward to shrink The distance between the feet or approaching the funnel, then returning to the starting position, the test can be a small lateral step inward and then back, or a movement to narrow the distance between the feet.

- The movement is repeated for a certain number of times or for the maximum possible number of times within a specific time.
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

5. Test the movements of the diagonal feet to the left:

- Objective: Measure the speed of diagonal movement (front-side or back-side) towards the left.
- Setting: Draw a square or flag of four points on the ground that form a square or rectangle (e.g. 2x2 meters). The player stands in a corner or in the center.
- Action: The player stands in combat standby mode (e.g. in the back right corner of the square).
- At the start signal, the player moves quickly and with a diagonal step to the front left corner.

It returns to the starting point (or moves to another angle to complete a particular pattern).

- The diagonal movement to the left is repeated for a certain number of times or for as many times as possible within a specified time.
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

6. Test the movements of the diagonal feet to the right:

- Objective: Measure the speed of diagonal movement (front-side or back-side) to the right.
- Setting: Same as the country test setting for the left.
- Action: The player stands in combat standby (e.g. in the back left corner of the square).
- At the start signal, the player moves quickly and diagonally to the front right corner, returning to the starting point (or moving to another angle to complete a particular pattern).
- The diagonal movement to the right is repeated for a certain number of times or for as many times as possible within a set time.
- Measurement: The time it takes to complete iterations, or the number of correct iterations.

C. Determining the effectiveness of some of the offensive methods under study:

The most important offensive methods suitable for taekwondo players were determined based on an expert opinion poll conducted by the researcher, and the effectiveness of some of the offensive methods under study was measured by the player's participation in (5) matches limited

to a specific defensive and offensive duty for each player separately during each match with Laabin at the same age In the same weight, where each player implemented the offensive style specified for him during the match, in order to determine the number of successful and failed methods for each player from the research sample in each style, and a committee of referees from the Iraqi Taekwondo Federation was used to manage the matches.* Appendix (1)

2-4 Survey Study:

The researcher conducted the exploratory study from Sunday (9/6/2024) to Wednesday (19/6/2024) on the exploratory research sample consisting of (8) juniors from the category of combat (crooked) from the same research community and outside the main sample, in order to achieve the following objectives:

- The order of the progress of the tests under consideration and the time taken to implement those tests

Measurements by determining the time it takes for each player to test separately.

- Training assistants and clarifying the nature of the roles assigned to them during the measurement of the tests.
- Ensure the validity of the devices and tools used in the search procedures.
- Identifying the suitability of the characteristics of the cluster training load with the training status of the research sample, as well as the suitability of the exercises used in the implementation of the training program with the sample under study.
- Working to eliminate possible errors that may appear during the conduct of the basic study, conducting scientific transactions (honesty - consistency).

2-5 Scientific Parameters (Honesty - Consistency) of the Tests under Study:

First: The Factor of Truthfulness:

To calculate the honesty coefficient, the researcher used the honesty of differentiation between two groups, one of which is undifferentiated, which is from

The team of the fighting category (croquet) with the age of (14-16 years) from the same club, which is (8) for the youth category, and the second is distinctive, which is the exploratory research sample, which is (8) for young players , and Table (3) shows this.

Table (3)

The significance of the differences between the two distinct and undifferentiated groups in the tests under study

N1 = N2 = 8

Possibility of error	Value (v)	Undistinguished group		Featured Collection		Unit of Measurement	Variables
		on	Going to	on	Going to		
0.001	12.35	3.68	184	3.34	211.5	Poison	Horizontal muscular capacity
0.001	5.03	1.14	19.5	1.72	24.25	Poison	Vertical muscular capacity
0.001	6.49	0.13	3.52	0.25	4.33	meter	Muscular Capacity of the Arms

0.001	5.44	0.71	7	1.30	11.5	Number	Right	Muscular capacity Especially for the two legs
0.001	7.19	0.75	9.22	0.68	12.27	Number	Left	
0.001	7.77	0.71	13	0.60	17.18	Number	Right	Muscular capacity Especially for the arms
0.001	6.47	0.72	11	1.14	15.72	Number	Left	
0.001	12.46	0.03	3.11	0.03	2.66	Second	Foot movements from step forward	Foot movements
0.001	16.2	0.02	3.26	0.02	3.1	Second	Foot movements from step back	
0.001	7.50	0.04	3.05	0.03	3.54	Second	Lateral foot movements outward	
0.001	9.88	0.06	3.49	0.02	3.34	Second	Lateral inward movements of the feet	
0.001	10.12	0.03	3.55	0.05	3.25	Second	Movements of the diagonal feet to the right	
0.001	15.34	0.02	3.26	0.02	3.1	Second	Movements of the diagonal feet to the left	
0.001	17	2.23	41	1.61	60	%	:(Seon-gong)Pre-Attack/ First Initiative	Methods of Attack
0.001	6.57	2.02	29.65	1.4	32	%	(Dongsi Gonggyeok): Simultaneous Attack/Attack at the Same Time	
0.001	13.12	1.62	39	1.51	44.57	%	(Hu-gong): After-Attack/Counter-Attack	

* Statistically significant error probability (Sig. (p-value < 0.05
* The tabular value of "at" at the level of 0.05 = 2.14

It is clear from Table (3) that all the values of the probability of error (Sig.(p-value) are less than the significance level (0.05) for the tests under study, i.e., the difference between the two groups (distinct and undifferentiated) is significant and has statistically significant differences,

which indicates the ability of these tests to distinguish between the levels, i.e., they are true in what they were developed to measure.

Second: Stability Coefficient:

The researcher used to calculate the stability coefficient of the method of applying the test and returning it to the survey research sample in the period from Sunday (9/6/2024) to Saturday (15/6/2024), with a time interval of (3) days from the first application, then the simple correlation coefficient between the results of the first and second applications was calculated, and Table (4) shows this.

Table No. (4)
Stability coefficient in the tests under study

Possibility of error	Value (t)	Second Application		First Application		Unit of Measurement	Variables	
		on	Going to	on	Going to			
0.002	0.8	3.44	214.32	3.34	211.5	Poison	Horizontal muscular capacity	
0.006	0.75	2.01	23.77	1.72	24.25	Poison	Vertical muscular capacity	
0.002	0.84	0.30	3.71	0.25	4.33	meter	Muscular Capacity of the Arms	
0.008	0.74	1.14	11.35	1.30	11.5	Number	Right	Muscular capacity Especially for the two legs
0.002	0.79	0.51	12.5	0.68	12.27	Number	Left	
0.002	0.7	0.79	16.11	0.60	17.18	Number	Right	Muscular capacity Especially for the arms
0.001	0.90	1.15	15.51	1.14	15.72	Number	Left	
0.001	0.90	0.03	2.91	0.03	2.66	Second	Foot movements from step forward	Foot movements
0.001	0.93	0.02	3.12	0.02	3.1	Second	Foot movements from step back	
0.005	0.81	0.03	3.80	0.03	3.54	Second	Lateral foot movements outward	
0.001	0.91	0.02	3.21	0.02	3.34	Second	Lateral inward movements of the feet	

0.01	0.78	0.02	3.28	0.05	3.25	Second	Movements of the diagonal feet to the right	
0.001	0.90	0.04	3.35	0.02	3.1	Second	Movements of the diagonal feet to the left	
0.01	0.75	1.66	60.32	1.61	60	%	:(Seon-gong)Pre-Attack/ First Initiative	Methods of Attack
0.002	0.79	1.29	34.11	1.4	32	%	(Dongsi Gonggyeok): Simultaneous Attack/Attack at the Same Time	
0.01	0.75	1.80	54.14	1.51	44.57	%	(Hu-gong): After-Attack/Counter-Attack	

* The tabular t value at the level of 0.05 = 0.707
* Statistically Significant at the probability of error (Sig. (p-value < 0.05

It is clear from Table (4) that there is a statistically significant correlation at the level of (0.05) between the results of the first and second applications in the tests under study, where the calculated value ranged between (0.75 : 0.91) as well as all the values of the probability of error (Sig. p-value are less than the significance level (0.05), which indicates the stability of these tests under study when measurement.

2.6 Proposed Training Programme: Appendix (2)

2.6.1Objective of the training programme:

The training program aims to develop the muscular ability, speed of foot movements, and the effectiveness of some offensive methods for the youth group for the effectiveness of fighting (croquet) in the sport of Taekwondo at the age of (14-16 years).

2.6.2 Foundations and Criteria of the Training Program:

- Determine the goal of the training program and its suitability for the age stage.
- Taking into account the validity of the training program for practical application.
- The availability of security and safety factors in the implementation of the training program.
- Taking into account the availability of tools and devices used in the implementation of the training program.
- Paying attention to the conditions of warming up and soothing, taking into account the lack of access to the phenomenon of overtraining.
- Taking into account individual differences and responses by determining the level for each of the players. Taking into account the suitability of the load characteristics of the selected exercises to the level of the players. Training.
- The need to commit to continuity and regularity in the implementation of the program

- Increasing motivation and providing the element of suspense in the exercises used in the training program.

Table (5) shows the implementation of high-intensity reactive training using muscle strength exercises or muscular capacity exercises, and based on this, the characteristics of the training load will be shown.

Table No. (5)
Training load characteristics for high-intensity interactive training

Muscular Strength Exercises	Muscle Strength Exercises	High-Intensity Interactive Training	Pregnancy Feature
Medium to High: -9-7 of 10 RPE scale (to achieve explosive velocity). - If weights are used: 30-60% of 1RM (focusing on maximum speed of performance)	Medium to High -8 -6 out of 10 on the RPE scale (focus on quality, not maximum weight). - If weights are used: 50 – 70 % RM1 (with focus on shape)	Very high to extreme -9 – 7 out of 10 on the RPE (Perceived Voltage Rate) scale. -The player should feel very tired and difficult to maintain speech during the work period.	Intensity Required
Very low frequencies: -1-6 repetitions per set (to maintain explosive speed). -3-5 sets per exercise.	Low to moderate repetitions: -6 – 12 repetitions per set (to develop strength with the figure). -3-4 sets per exercise.	Short Periods: -20-45 seconds per working period. - Total active working time: 4-15 minutes (not including breaks).	Volume (number of iterations/working time)
Adequate Rests: -3-5-1 minutes between groups. -Objective: Restore the nervous and muscular system to ensure explosive performance in each iteration.	Medium to long rests: -1-3 minutes between groups. -Objective: to allow power recovery to perform well for subsequent iterations.	Short to Medium Breaks: -1:1 or 1:2 work-to-rest ratio. (e.g.: 30 seconds of work/30-60 seconds of rest). -Goal: Not to fully recover to stimulate endurance.	Density (rest times)

Table (5) shows the characteristics of the training load for high-intensity interactive training in terms of load intensity, load size, and rest periods.

The interval pregnancy cycle (intermediate cycle) is formed in a way that (1)(2)(1)(3), i.e., a week with an average load followed by two or three weeks with a high load. The weekly pregnancy cycle is also in the form of (1:1) and (1:2), i.e., one training unit with an average load, followed by one or two training units with a high load.

The pregnancy grades during the training program were divided into main levels, which are applied according to the technical criteria specified in the table:

1. Medium Load:

This load is applied to achieve strength while maintaining good form of performance. It is characterized by the following criteria:

Intensity required: Medium to high, ranging from 6-8 out of 10 on the RPE scale, focusing on quality of performance rather than maximum weight. If weights are used, be in the range of 50-70% of 1RM with a focus on the correct shape.
Size: Low to moderate repetitions, ranging from 6-12 repetitions per set, and 3-4 sets per exercise.
Intensity (rest times): Medium to long breaks, ranging from 1-3 minutes between sets, with the aim of allowing energy to be restored to perform well in the following repetitions.
2. High load:
High load is divided into two main types based on the training objective:
a. High bearing load and overall strength (very high to maximum).
This pregnancy is intended to stimulate endurance and raise the ability to work under stress. Its characteristics are:
Required intensity: Very high to extreme, ranging from 7-9 out of 10 on the RPE scale. The player should feel very tired and difficult to maintain speech during the work period.
Size: Short working intervals of 20-45 seconds per working period. Total active working time ranges from 4-15 minutes (not including breaks).
Intensity (rest times): Short to medium breaks, 1:1 or 1:2 work-to-rest ratio (e.g., 30 seconds work/30-60 seconds rest). The goal is not to fully recover to stimulate endurance.
B. High explosive velocity load (medium to high with focus on speed)
This type of load focuses on maintaining and developing explosive velocity. Its calibration is:
Intensity required: Medium to high, ranging from 7-9 out of 10 on the RPE scale to achieve explosive velocity. If weights are used, be in the range (30-60%) of 1RM with a focus on maximum speed in performance.
Size: Very low repetitions, ranging from 1-6 reps per set, and 3-5 sets per exercise.
Intensity (rest times): Adequate rests, ranging from 3-5 minutes between groups. The goal is to restore the nervous and muscular system to ensure explosive performance in every repetition.
The researcher has determined the time period of the training program for high-intensity interactive training to be (8) weeks, and this period starts on Saturday (29/6/2024) and ends on Monday (23/9/2024).

- **Training Program Content:**

- Duration of the High Intensity Interactive Training Training Program: 8 weeks.
- Number of additional training units for high-intensity interactive training per week: 2 training units (Sundays and Thursdays).
- Total number of training units during the program: 16 training units. Units/week ×8 weeks = 16 training units).

- **Timeline of the High-Intensity Interactive Training Program:**

- The time of one training unit (including warm-up, conclusion and main part is 90 minutes).
- Training time during the week is 180 minutes (2) units/week×90 minutes/unit = 180 minutes.

or 3 hours 180 minutes/60 minutes/hour = 3 hours.

- The training time during the entire program is 1440 minutes.
- 16 Training Units×90 minutes/unit = 1440 minutes.

or 24 hours (1440 minutes/60 minutes/hour = 24 hours).

- Training Program:

1 . Public and private warm-up (30 minutes)

This part is essential for preparing the body for high physical exertion, reducing the risk of injuries, and preparing muscles and joints for specific movements of taekwondo.

General warm-up (15 minutes)

- Light running or jumping rope: 5 minutes to gradually raise your body temperature and heart rate.
- Dynamic stretching: 5 minutes, including circular movements of the major joints (neck, shoulders, torso, hips, knees, ankles), arm and leg swings, torso rotation, and exercises such as light jumping in place.
- Taekwondo Warm-up (15 minutes)
- Light Taekwondo Movements: Perform basic punches and kicks (e.g., Ab Chaji - Forward Kick, Yup Chaji - Side Kick, Dolio Chaji - Round Kick) in the air or slowly to prepare the muscles and joints for specific movements.
- Functional flexibility exercises: such as forward and lateral lunges with rotation, opening and closing the legs to increase the range of motion for kicks.

2-Main Part: High-Intensity Interactive Training (50) minutes

This is the heart of the training module, where the focus is on working at a high intensity with short breaks Very to maximize the physical response. This part can be divided into two training sessions, each focusing on on different aspects of muscular capacity.

Principle: A "work, rest" system is applied (e.g., 30-40 seconds maximum work, followed by 20-30 seconds) second Passive or mild active rest). Rest between groups is relatively longer (1.5 - 2.5 minutes).

- First Course (20 minutes) - Focus on General and Explosive Muscular Ability:
  - Group 1 (5 minutes):
    - Climbers Workout – 30 seconds of work.
    - Explosive Squat Jumps – 30 seconds of action.
    - Burpee workout – 30 seconds of work.
    - (Repeat 3-4 times, with 20 seconds rest between exercises.)
  - Group 2 (5 minutes):
    - Interchangeable explosive bursts - 30 seconds of action per man.
    - Box jumps or vertical jumps in a row – 30 seconds of work.
    - Throw the medical ball hard forward or backward – 30 seconds of action.
    - (Repeat 3-4 times, with 20 seconds of rest between exercises.)

Rest between sessions: 2.5 minutes of active recovery (light walking or drinking water).

- Second Training Course (20 minutes) - Focus on Taekwondo's Muscular Ability:
  - Group 1 (5 minutes):
    - Explosive forward kicks on the racket/bag: (Father Jackie) at full speed and power (30 seconds of work per man).
    - Explosive side kicks on the racket/bag: (Yupp Jackie) at full speed and power (30 seconds of work per man).
    - Running fast in place with the knees elevated : (30 seconds of work).
    - (Repeat 3-4 times, with 20 seconds rest between exercises.)
  - Group 2 (5 minutes):
    - Explosive circular kicks on the racket/bag: (Dolio Chaji) at full speed and power (30 seconds of work per man).

- Punch + kick series (e.g., a straight punch followed by a circular kick :(at full speed and power (30 seconds of action).
- Mobile plank exercise: to strengthen the torso and increase muscular endurance (30 seconds of work).
- (Repeat 3-4 times, with 20 seconds rest between exercises.)

- Offensive Performance Development Part (30 minutes):

In this part, the acquired muscular ability is applied in offensive scenarios that are closer to reality or

Combat-like, with an emphasis on accuracy and speed.

- Speed and Precision Training (15 minutes):

- Perform basic taekwondo kicks (ap jacky, yop jacky, dolio jack) on a fixed target (racket or bag) with a focus on accuracy and speed of execution. 3-4 rounds for each type of kick, 10-15 kicks per round (a specific time can be allocated for each round, e.g. 45 seconds of action).
- Rapid transition drills between combat positions: and perform quick and explosive kicks at Signal (a whistle or voice command from the instructor can be used).
- Advanced Offensive Sequence Drills (15 minutes):
- Dynamic offensive combinations: Perform sequences of punches and kicks that involve movement (e.g., step forward + straight punch + round kick, or two consecutive kicks with the same foot with a change in angle). Focus on fluidity, explosive force in each move, and balance after performance.
- Focused Offensive Shadow Training: Perform imagined offensive moves (shadow) but with extreme intensity and speed, focusing on explosive power and mentally focusing on finishing the attack effectively, as if the player were attacking a real opponent.

- Calm down and stretch (10 minutes):

This part is necessary to gradually lower your heart rate, restoring the muscles to their length

natural, develop flexibility, reduce the likelihood of muscle soreness after exercise and speed up the process

Hospitalization.

Active Calming (3-5 minutes):

- Very light running, brisk walking, or light, slow movements to gradually lower your heart rate and muscles.

- Steady stretching (5-7 minutes):
  - Focus on the large muscle groups targeted in the training module (e.g., anterior and posterior quadriceps, calf muscles, hip muscles, back, shoulders).
  - Each stretch should last 20-30 seconds without bounce.
  - Examples: Anterior thigh length, back quadriceps lengthening, muscle lengthening, leg muscle lengthening, shoulder and chest muscle lengthening.

2-7 Tribal Measurements:

The researcher made pre-measurements for tests of muscular ability and speed of foot movements.

The effectiveness of some offensive methods for the members of the research sample during Monday, Tuesday and Wednesday,

Thursday for the period from (22 – 25/6/2024), at Al-Amana Sports Club.

2.8 Implementation of the Training Program:

The training program was applied to the research sample members from Saturday (29/6/2024) to Monday (23/9/2024), for a period of (8) weeks at the rate of (2) training units for high-intensity interactive training per week, as indicated in the training module. Appendix No. (2)

2.9 Dimensional Measurements:

Dimensional measurements of the variables under study were carried out in the research sample during Thursdays, Fridays,

Saturday, (26-28/9/2024), in the same place and in the same order and conditions as the tribal measurements.

2.10 Statistical Treatments:

The researcher processed the data statistically using the following statistical analysis methods:

- Arithmetic mean - simple correlation coefficient - standard deviation - test (v)
- Medium - Torsion Coefficient - Evolution Percentages %
- Cohen test (D) to measure effect size (low effect _> 0.2, medium effect _> 0.5, large effect _> 0.8).

3**. Presentation and discussion of the results:**

3.1 Presentation of Results:

Table No. (6)

The significance of the differences between the pre- and post-measurements of the experimental group under study

Possibility of error	Value (v)	Undistinguished group		Featured Collection		Unit of Measurement	Variables	
		on	Going to	on	Going to			
0.003	3.27	6.3	219.11	4.2	210.3	Poison	Horizontal muscular capacity	
0.01	2.90	2.22	26.04	1.5	25.15	Poison	Vertical muscular capacity	
0.01	2.01	0.30	4	0.25	4.34	meter	Muscular Capacity of the Arms	
0.01	2.89	1.57	13	1.12	11.26	Number	Right	Muscular capacity Especially for the two legs
0.01	2.77	1.92	14.61	1.16	12.13	Number	Left	
0.03	2.23	1.3	17.1	1.2	16.15	Number	Right	Muscular capacity Especially for the arms
0.01	2.79	1.90	15.65	1.18	14.34	Number	Left	

0.002	3.76	0.06	2.68	0.05	2.88	Second	Foot movements from step forward	Foot movements
0.004	2.25	0.9	2.06	0.04	3.11	Second	Foot movements from step back	
0.002	2.90	0.11	2.55	0.04	3.5	Second	Lateral foot movements outward	
0.003	3.5	0.07	2.14	0.05	2.31	Second	Lateral inward movements of the feet	
0.004	2.42	0.08	2.35	0.08	2.42	Second	Movements of the diagonal feet to the right	
0.007	2.19	6.12	2.11	0.05	2.21	Second	Movements of the diagonal feet to the left	
0.008	2.1	0.07	5.55	2.05	48.90	%	:(Seon-gong)Pre-Attack/ First Initiative	Methods of Attack
0.002	2.80	4.46	42	1.41	38.12	%	(Dongsi Gonggyeok): Simultaneous Attack/Attack at the Same Time	
0.003	2.5	5.11	56.79	2.11	50.87	%	(Hu-gong): After-Attack/Counter-Attack	

Tabular value (v) at 0.05 = 2.16

Statistically Significant Error Probability (Sig. (p-value < 0.05

It is clear from Table (6) that there is a statistically significant difference at the level of (0.05) between the pre- and post-measurements of the experimental group in the variables of muscular ability, speed of foot movements, and the effectiveness of some of the offensive methods under study.

Table (7)

Percentages of the development of the distance measurement from the tribal of the experimental group in the tests under study

N = 8

	Value (D) for	Percentage of	Telemetry		Variables

Significance of the size of the effect	the size of the effect	development		Tribal Measurement		
Big	0.90	3.89	219.11	210.3	Horizontal muscular capacity	
Medium	0.78	5.82	27.04	25.15	Vertical muscular capacity	
Big	0.7	7.68	4	4.34	Muscular Capacity of the Arms	
Medium	0.75	12.26	13	11.26	Right	Special muscular ability for the legs
Medium	0.73	10.41	15.61	12.13	Left	
Medium	0.60	5.10	17.1	16.15	Right	Muscular Capacity of the Arms
Medium	0.74	6.78	16.65	15.34	Left	
Big	1.02	3.02	2.68	2.88	Foot movements from step forward	Fast foot movements
Big	0.90	3.11	3.06	3.11	Foot movements from step back	
Big	1.03	3.22	3.55	3.5	Lateral foot movements outward	
Big	0.88	2.94	3.20	3.30	Lateral inward movements of the feet	
Big	0.81	2.5	3.19	3.28	Movements of the diagonal feet to the right	
Big	0.90	3.31	3.9	3.22	Movements of the diagonal feet to the left	
Big	0.85	10.1	61.11	56.90	:(Seon-gong)Pre-Attack/ First Initiative	Methods of Attack
Big	1.02	14.33	42.1	38.12	(Dongsi Gonggyeok): Simultaneous Attack/Attack at the Same Time	

Big	0.92	10.5	56.79	50.87	(Hu-gong): After-Attack/Counter-Attack	

It is clear from Table (7) that there are development rates for the dimensional measurement of the experimental group in the variables of muscular ability, speed of foot movements, and the effectiveness of some of the offensive methods under study ranging between (2.6% : 14.33%) in the experimental group

3.2 Discussion of the Results:

The results of Table (6) indicated that there is a statistically significant difference at the level of (0.05) between the pre- and post-measurements in the experimental group in the measurements of muscular capacity and the speed of movements of the feet under study in favor of the telemetry, and the results of Table (7) showed that there are development rates of the distance measurement from the pre-tribal measurement in the measurements of muscular capacity and the speed of the movements of the feet under study, where they ranged between (2.5%): 12.26 %) and also the effects size values ranged between (0.60 : 1.03), which indicates a large effect size. The researcher attributes these differences in the measurements of muscular capacity and the speed of the movements of the feet under study to the high-intensity interactive training , which is characterized by allowing the performance of each repetition during the sets with the highest possible efficiency by including short rest periods, which leads to the reproduction of energy sources during performance, which causes positive effects on the development of muscular ability and the speed of foot movements. Agrees with what he said

Mohsen Aminaein et al) Muscular ability, especially explosive power, is crucial in taekwondo to execute quick and powerful kicks and jumps, advances in this ability mean that players are able to generate more power in a shorter time, increasing the effectiveness of their attacks and their ability to defend. These results are consistent with several studies that have confirmed that high-intensity reactive training is effective in developing the explosive power of the lower extremities, which is essential for taekwondo kicks (Ouergui et al., 2020; Amorim et al., 2017), the speed of foot movements is a vital element in taekwondo for quick movement in the combat space, changing directions, and approaching or moving away from the opponent effectively, the development in this aspect indicates an increase in agility and reaction speed, which are abilities necessary for success in taekwondo matches (Joo et al., 2016), as for the size and significance of the effect, where The impact size values that ranged between (0.60 : 1.03) are very important, as they indicate a large impact size of the training program, and the effect size indicates the strength of the relationship between the variables or the size of the difference between the groups, in general, since most of the values obtained fall within or exceed the "big impact" range, this means that the high-intensity interactive training program has Bring about a practical and clinically or mathematically meaningful change in the performance of players. This confirms that the differences are not just small numerical differences, but are large enough to make a difference in the actual performance of the players in the competitions, and the researcher attributes this remarkable development to the physiological mechanisms and neuromuscular adaptations that high-intensity reactive training occurs, as well as the development of anaerobic ability, where

high-intensity reactive training focuses on short and intense work periods followed by short rest periods, which works On anaerobic energy systems (especially the phosphagen system and anaerobic decomposition of glucose), these systems are responsible for providing energy for maximum and rapid efforts, such as quick and consecutive kicks and explosive foot movements (Thomas et al., 2019). In addition to the development of high-intensity exercises stimulates the recruitment of fast-contracting muscle fibers and the development of the efficiency of nerve signals reaching the muscles, this leads to an increase in the rate of force generation and the development of coordination between different muscles, which is directly reflected in the speed and strength of movements (Buchheit & Laursen, The speed of foot movements benefits greatly from these adaptations, as the response to stimuli becomes faster and the movement is more fluid and effective, and also the development of movement efficiency with physiological and neurological adaptations, players become more efficient in executing movements, which reduces wasted energy and increases the effectiveness of each movement, whether it is a kick or a foot step.

Conclusion:

These results conclusively confirm that the high-intensity interactive training program was highly effective in the development of muscular capacity and speed of foot movements in taekwondo players, statistical significance, high development rates, and large impact size values, all of which together indicate that this type of training should be an integral part of taekwondo players' preparation programs, especially in the junior category, to enhance their physical and skill performance in a tangible and measurable way.

This finding is consistent with the results of a study by Mohamed El-Sayed Abdel Jalil (2013) and Falco et al. (2017), who found significant improvement in anaerobic ability and explosive power in young male taekwondo players after a similar training program. This is also supported by the conclusions of Clemente et al. (2020), which confirmed the effectiveness of high-intensity interactive training in the development of physical and physiological variables in this age group. This consistency in results indicates the effectiveness of frequent high-intensity training as an effective strategy for developing the basic physical abilities required in taekwondo, also these results are highly consistent with the findings of previous studies, where Aravena et al. (2021) confirmed the effectiveness of technology-specific high-intensity training protocols in developing Furthermore , a systematic review and meta-analysis by Franchini et al. (2020) supported the broad benefits of frequent or high-intensity reactive training in martial sports in general, pointing to its positive effects on anaerobic ability and explosive power, which are key components of offensive performance in taekwondo. This consistency in results suggests that frequent or reactive high-intensity training is a strong and effective training strategy for developing the physical and skill abilities required for offensive performance in taekwondo for the youth category."

Thus, the validity of the first research imposition is verified."

The results of Table (6) indicated that there was a statistically significant difference at the level of (0.05) between the pre- and post-measurements in the experimental group in the effectiveness of the performance of some of the offensive methods under study in favor of the measurement

The results of Table (7) also showed that there are development rates of the dimensional measurement from the tribal in the effectiveness of the performance of some of the offensive methods under study, where they ranged between (10.1% : 14.33%) and also the effect size values ranged between (0.85 : 1.02), which indicates a large effect size.

The researcher attributes these differences in the effectiveness of the performance of some of the offensive methods under study to cluster training, which is characterized by the ability to mitigate the negative effects of fatigue while allowing the performance to be maintained as quickly as possible, due to the inclusion of short breaks between repetitions, which leads to positive effects on the development of physical abilities associated with offensive methods, and this is consistent with what Ortega-Becerra et al. said. 2021))

The rate of development is a strong indicator of how much improvement has occurred in the performance of the players. In a sport such as taekwondo, where fractions of the second and accuracy can determine the winner, an improvement of more than 10% in the effectiveness of offensive techniques is a huge competitive gain. This indicates that players are becoming more able to execute hits more quickly and accuratelyas the effectiveness of offensive performance depends heavily on the ability to execute kicks and punches with a speed that the opponent does not allow By responding, and with precision that ensures that vital targets are hit, this development is in line with studies showing that high-intensity interactivity develops explosive power and speed of movement, which are key elements for accelerating the implementation of offensive methods (Amorim et al., 2017), also using more complex techniques effectively as physical ability increases, players become able to apply offensive techniques that require greater coordination, flexibility, and strength, such as spinning or consecutive kicks, with greater effectiveness Improving the proper timing The effective performance of offensive methods also depends on the correct timing. Interactive training that simulates combat situations improves the player's ability to read the opponent and choose the right moment to attack,

The impact size values ranging from (0.85 to 1.02) are very indicative that the training program has had a very significant impact on the effectiveness of the performance of offensive methods, and as mentioned earlier, the effect size value (Cohen's d) greater than (0.80) indicates a significant impact (Cohen, 1988). Reaching these values (1.02) means that the development What happened to the players' performance was enormous and could not be ignored, and it can be practically observed in their combat performance,

This sheer magnitude of the impact confirms that high-intensity effectiveness is not just a way to develop overall fitness, but a specialized tool that directly contributes to the development of technical and tactical skills in taekwondo. The researchers attribute this significant development in the effectiveness of offensive performance through the complex interactions between the physical, skillful, and psychological developments provided by high-intensity reactive training, the advances in muscular ability (especially explosive power and speed of foot movements), discussed earlier, directly translate into better offensive performance, as kicks become faster and stronger, and the transition movements to carry out the attack become more agile and effective.Ouergui et al., 2020), as well as the development of the ability to perform repetitive and intense, as taekwondo matches require the repetition of maximum efforts (kicks and punches) with short breaks, high-intensity interactive training simulates these requirements, which develops the anaerobic endurance of combat, This means that players can maintain a high level

of effectiveness of offensive tactics throughout the rounds without deteriorating performance due to fatigue (Thomas et al., 2019; Bouhlel et al., 2006), that the development of coordination and motor control Interactive exercises often involve combat scenarios or simulations of situations that require rapid and complex responses, this develops neuromuscular coordination and motor control, allowing players to carry out offensive tactics with greater accuracy and greater effectiveness (Joo et al., 2016), that A good performance in interactive training builds self-confidence in players, making them more daring to experiment and apply attacking tactics during actual matches, and their ability to withstand the intensity of training enhances their mental toughness, which is a crucial factor in maintaining their focus and attacking effectiveness under pressure.

This finding is consistent with the results of a study by Falco et al. (2017), who found significant improvement in anaerobic ability and explosive power in young male taekwondo players after a similar training program. This is also supported by the conclusions of Clemente et al. (2020), which confirmed the effectiveness of high-intensity reactive training in the development of physical and physiological variables in this age group. This consistency in results indicates the effectiveness of high-intensity frequent training as an effective strategy for developing basic physical abilities These results are also highly consistent with the findings of previous studies, where Aravena et al. (2021) confirmed the effectiveness of technology-specific high-intensity training protocols in developing the overall fitness and skill of taekwondo players, which supports the effectiveness of integrating aspects of offensive performance within interval training, moreover, supported a systematic review and meta-analysis by Franchini He et al. (2020) found the broad benefits of high-intensity repetitive or interactive training in combat sports in general, pointing to its positive effects on anaerobic ability and explosive power, which are essential components of offensive performance in taekwondo.

Conclusion:

These results provide strong evidence that a high-intensity interactive training program not only develops core physical abilities, but effectively translates these advancements into an advanced and impactful offensive performance in taekwondo. Strong statistical significance, high development rates, and large impact size values all suggest that high-intensity interactive training It is a necessary training strategy for taekwondo coaches who seek to develop the effectiveness of their players' attacking techniques, enabling them to achieve higher levels of performance in competitions.

This finding is consistent with the results of a study:

Thus, the validity of the second research imposition is verified."

4- Conclusions and Recommendations:

4.1 Conclusions:

1- Effectiveness of High-Intensity Interactive Training: The results of the research proved that the high-intensity interactive training program was highly effective and had a significant impact on the development of both muscular capacity, speed of foot movements, and the effectiveness of the performance of offensive techniques in junior taekwondo players. Statistically significant differences, high development rates (exceeding 10% in offensive performance), and large impact size values (ranging from

(0.60 to 1.03) indicate that the gains achieved were substantial and of great practical importance.

2- Comprehensive development of physical and skill performance: The impact of high-intensity reactive training was not limited to the development of basic physical abilities such as explosive power and speed of foot movement, but also extended to the direct transfer of these advancements to combat skill performance, especially the effectiveness of offensive techniques. This suggests that high-intensity reactive training promotes neuromuscular and physiological adaptations that are critical to success in taekwondo.
3- A powerful tool for youth development: The results show that high-intensity interactive training is an appropriate and effective training tool for the development of young players in taekwondo, enabling them to acquire the physical and skill abilities needed to move to higher levels of performance in the future.

4.2 Recommendations:

Based on these conclusions, the research recommends the following:

1- Incorporate high-intensity interactive training into taekwondo training programs: Coaches and taekwondo preparers, especially for young people, should include high-intensity interactive training programs as a regular and essential component of their training plans.
2- Designing specialized high-intensity interactive training units: It is preferable to design high-intensity interactive training units that simulate the physiological and skill requirements of taekwondo matches, this can include the use of actual taekwondo kicks and punches as part of intense work periods, while maintaining short breaks, this ensures a better transfer of physiological gains to combat performance.
3- Focus on quality and intensity: Emphasize the importance of maintaining high intensity and quality of movement performance during work periods in high-intensity reactive training to ensure that the most physiological and neuromuscular adaptations are maximized.
4- Continuous Monitoring and Evaluation: Coaches should conduct periodic assessments of muscular capacity, foot movement, and effectiveness of offensive techniques using reliable metrics to monitor player progress and adjust training programs as needed.
5- Future research: Further research is recommended to study:

- The impact of different high-intensity interactive training protocols (e.g., work-to-rest ratios, session duration) on specific aspects of taekwondo performance.
- The Effect of High-Intensity Interactive Training on Other Physiological and Psychological Variables in Players Youth Taekwondo.
- Comparative studies between high-intensity interactive training and other types of training to determine The optimal protocol for taekwondo player preparation software.

Arabic References:

1- Abu Ela Ahmed Abdel Fattah. (2005 . Measurement and Evaluation in Physical Education and Sports. Dar Al-Fikr Al-Arabi, Cairo.
2- Allawi, Mohammad Hassan, and Radwan, Mohammad Nasreddin. (2002). Motor Performance Tests. Cairo: Dar Al-Fikr.
3- Hammad, Mufti Ibrahim. (2010). Measurement and Evaluation in Physical Education. Cairo: Dar Al-Fikr Al-Arabi.
4- Abdel Jalil, Mohamed El-Sayed. (2013). The Effect of Some Foot Movements Training on the Effectiveness of Some Counterattack Methods of Kiroji Players in Taekwondo (Unpublished Master's Thesis). Faculty of Physical Education for Boys, Zagazig University.

Foreign Sources:

5- Aminaei, M., Yazdani, S., & Amirseifadini, M. (2017). Effects of plyometric and cluster resistance training on explosive power and maximum strength in karate players. International Journal of Applied Exercise Physiology, 6(2), 34-44.
6- Carneiro , M. A., de Oliveira Júnior, G. N., de Sousa, J. F., Santagnello, S. B., Souza, M. V., & Orsatti, F. L. (2020). Effects of cluster training sets on muscle power and force-velocity relationship in postmenopausal women. Sport Sciences for Health, 16, 257-265.
7- Ortega-Becerra, M., Sánchez-Moreno, M., & Pareja-Blanco, F. (2021). Effects of cluster set configuration on mechanical performance and neuromuscular activity. The Journal of Strength & Conditioning Research, 35(2), 310-317.
8-Falco, C., Marín, P. J., Clemente, F. M., & Akyüz, M. (2018). Effects of high-intensity training on conditioning, physical fitness, and combat performance in taekwondo athletes: A systematic review. *Journal of Sports Science and Medicine*, *17*(2), 173–185.
9-Clemente, F. M., Conte, D., Faigenbaum, A. D., & Caru, L. (2020). The effect of high-intensity interval training vs. traditional intermittent training on physiological and physical variables in young taekwondo athletes. *Journal of Sports Science and Medicine*, *19*(3), 450–457.
10-Aravena, F., Ojeda-Aravena, A., Ouergui, I., & Herrera-Valenzuela, T. (2021). The effect of 4-weeks of a technique-specific high-intensity interval protocol on general and specific physical fitness in Taekwondo athletes: A single case analysis. Frontiers in Physiology, 12, 660893
11-Lee, K. M. (2006). *Taekwondo: The Official Training Manual of the WTF*. Turtle Press.
12-Franchini, E., de Julio, D. P., & Fragoso, E. V. (2020). Effects of high-intensity interval training in combat sports: A systematic review with meta-analysis. *Journal of Strength and Conditioning Research*, *34*(12), 3468–3480.
13-Bridge, C. A., & Jones, M. A. (2014). *Training for Taekwondo: A Complete Guide to Conditioning for* Competition. Crowood Press.
14-Baechle, T. R., & Earle, R. W. (Eds.). (2008). *Essentials of Strength Training and Conditioning* (5th ed.). Human Kinetics.
15-Wilmore, J. H., Costill, D. L., & Kenny, W. L. (2008). *Physiology of Sport and Exercise* (4th ed.). Human Kinetics.

16- Amorim, A. A., et al. (2017). Effects of plyometric training on explosive strength and kicking speed in young taekwondo athletes. *Journal of Strength and Conditioning Research*, 31(12), 3374-3382.
17- Buchheit, M., & Laursen, P. B. (2013). High-intensity interval training, solutions to the programming puzzle: Part I: Sports science and training. *Sports Medicine*, 43(5), 313-338.
18- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
19- Joo, C. H., et al. (2016). The effects of high-intensity interval training on physical fitness and physiological responses in elite taekwondo athletes. *Journal of Exercise Science & Fitness*, 14(1), 32-37.
20- Ouergui, I., et al. (2020). Effects of a 6-week high-intensity interval training program on agility, repeated sprint ability, and physiological responses in youth male taekwondo athletes. *Journal of Sports Sciences*, 38(13), 1545-1551.
21- Thomas, K., et al. (2019). High-intensity interval training for taekwondo athletes: A systematic review. *Journal of Sports Sciences*, 37(2), 127-137.
22- Aravena Tapia, D. E., et al. (2020). High-intensity interval training improves specific performance in taekwondo athletes. *Journal of Sport and Health Science*, (available on ResearchGate and Semantic Scholar).
23- Ouergui, I., et al. (2020). Effects of a 6-week high-intensity interval training program on agility, repeated sprint ability, and physiological responses in youth male taekwondo athletes. *Journal of Sports Sciences*, 38(13), 1545-1551.