

The Effect of Katsu Training on The Efficiency of Some Physical and Physiological Variables and Its Impact on The Level of Some Offensive Skills of Young Taekwondo Players

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DOI: <https://doi.org/10.47134/jpo.v2i3.1545>

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Received: 27-02-2025

Accepted: 27-02-2025

Published: 27-03-2025



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Abstract: The research aims to identify the effect of katsu training on the efficiency of some physical and physiological variables and its impact on the level of some offensive skills of young taekwondo players by determining. Because of its suitability for the nature of the research, the researcher used the experimental design with two measurements before and after one experimental group, and the researcher selected a random sample of (24) players registered in the Iraqi Taekwondo Federation from the youth category, and one of the most important results was that the Katsyu training caused a development in the physical, physiological and skill abilities of young Taekwondo players, and the most important recommendations were that Katsyu training should be used to develop the physical, physiological and skill abilities of Taekwondo players.

Keywords: Katsu Training, Physiological Variables, Taekwondo

Introduction

Introduction and importance of the research:

Sports training is one of the basic components of the sports preparation process, it is the focus that attracts everyone and at all levels, and the means through which the sports individual can be developed and prepared in various physical, skilled, physiological, mental, psychological and social aspects, thus giving him the full opportunity to perform his duties at the highest possible level of efficiency.

Taekwondo is a self-defense sport that originated and developed in South Korea more than 2300 years ago, and although this sport is similar to other self-defense sports in its use of hands and legs in blocking and striking, it relies more on the legs during matches, and Taekwondo, apart from being a sport with international rules, conditions and laws, is considered Tae Kwon Do is an extraordinary means of self-defense in that the player can defend and attack freely and flexibly in different directions (forward, backward and sideways) simultaneously using all parts of his body such as the hand, leg and knee, which

distinguishes Tae Kwon Do from other self-defense sports in its primary reliance on the legs, which are the foundation and backbone of the sport.

Athletic trainers, players and sports scientists are constantly looking for modern training methods to improve athletic performance and gain a competitive advantage, and Katsyu training is one of the latest techniques presented in the sports field, while the importance of research is evident in avoiding tying the compression band using wide straps, as well as the need to adhere to the correct compression places for the upper and lower limbs, where the end of the arm muscle is tied in the distance.

Between the biceps brachii and the underside of the anterior deltoid muscles by means of elastic bands, these bands were marked by sitting when the straps on the arms and legs were fastened, and after completing the training and lifting the bands, the blood flow should be checked by pressing the thumb of the palm of the hand and foot to ensure that the capillary pack is filled.

Research Problem

Taekwondo is one of the distinctive sports in the performance of its skills that require physical preparation as well as functional preparation, which makes the physical and physiological aspects essential to prepare the player and bring him to the so-called sports form to achieve the highest degree of achievement.

The sport of Taekwondo is characterized by fast performance and high effort during the match period, which requires the player to be physically and functionally prepared in addition to the skill and plan preparation in an integrated manner that allows him to complete the match with the same efficiency that he started on.

The researcher believes that physiological preparation is considered the basis of successful training programmers on which the coach relies heavily to train the athlete properly through exercises or physiological efforts directed to cause adaptation or functional change in the internal body systems to achieve an integrated level of the athlete. The researcher also believes .

Research Objectives:

1. The effect of katsu training on the efficiency of some physical variables of young taekwondo players.
2. The effect of katsu training on the efficiency of some physiological variables of young taekwondo players
3. The effect of katsu training on the efficiency of some offensive skills of young taekwondo players

Research hypotheses:

1. There are statistically significant differences between the two measurements (pre and post) of the experimental group for the physical variables of young taekwondo players in favor of the post measurement.
2. There are statistically significant differences between the two measurements (before and after) of the experimental group for the physiological variables of young taekwondo players in favor of the post-measurement.
3. There are statistically significant differences between the two measurements (pre and post) of the experimental group in some offensive skills of young taekwondo players in favour of the post-measurement.

Fields of research:

- **Human domain:** players of the youth team from the age of 14-17 years
- **Temporal domain:** 3/5/2024 to 7/10/2024
- **Spatial domain:** The internal hall of the National Talent Centre at the Ministry of Youth and Sports

Methodology

Research Methodology

The researcher used the experimental method to suit the nature of the research, and the researcher used the experimental design with pre and post measurements for one experimental group.

Research population

The research community includes Taekwondo players from the youth category, where the sample of the research community amounted to (30)

Research sample

a purposive sample of (24) players (80%) of the original population registered in the Iraqi Taekwondo Federation. The researcher divided the research sample into (12) to standardise the physical, physiological and skill tests by measuring reliability and stability, and (12) players as an experimental group to test the research variables on them and the following table shows this

Table 1. Numerical distribution of the research sample

Percentage	Number of players	Search categories
%50	12 player	Exploratory study
%50	12 player	Basic study
%100	24 player	Total sample size

The researcher set a set of conditions available in the selection, not less than 5 years old, not participating in other training programmers, and agreeing to apply the proposed programme).

Homogeneity of the sample

The researcher measured the basic variables of the research sample in the variables (age, height, weight, training age) in order to adjust the variables that may affect the research procedures and the following table (2) shows this.

Table 2. Statistical significance of the research sample in the basic variables before the experiment

Flocculation coefficient	Torsion coefficient	Standard Deviation	Medium	The arithmetic mean	Unit of measure	Statistical Significance
						Data
1.58	1.07	2.14	22.00	22.64	Year	Age
-1.24	-0.89	1.47	1.81	1.80	Meter	Length
1.47	1.89	1.71	75.50	76.19	Kg	Weight
1.02	0.64	2.01	6.50	6.58	Year	Training duration

the torsion coefficient range between (0.89- to 1.89), and the flattening coefficient ranges between (1.24- to 1.58). This value is close to zero, and the flattening coefficient ranged from (1.24 to 1.58), which means coscillating up or down, which confirms the similarity of the research group members in the initial variables before the experiment.

Physical and physiological tests and offensive skills of Taekwondo players used in the research

Atef Ali Abdelmutjali Abdelkader (2017), Mohammed Nasruddin Radwan et al. (2009), Nabil Hamed Shahin (2018), Takarada (2015), Takano (2005) to identify the physical and physiological tests and offensive skills of Taekwondo players, and the researcher found the following tests

Physical tests: (8, Marwa, 2007)

1. Running 800 meters to measure respiratory cyclic endurance
2. Standing on the metatarsal to measure static balance
3. Leg muscle strength to measure the maximum isometric strength of the extensor muscles of the legs.
4. Grip strength (right, left) to measure the strength of the grip muscles (finger flexor muscles).

Taekwondo players' offensive skills:

1. T-Beak Chagi (right, left)
2. Momtong Geryong in the abdomen (right, left)
3. Momtong Dolio Chagi (right, left)
4. Momtong dolichocephalic progressive (right, left)

5. Ti Chaji (right, left)
6. 6T. Aptolio Chaggi (right, left)
7. Ti Nara Chagi (right, left)

Devices and tools used under research:

1. Rastameter to measure height in centimetres and weight in kilograms.
2. Manometer for measuring grip strength in kilograms.
Digital dynamometer to measure the strength of the leg muscles and back muscles in kilograms.
3. Taekwondo mat, stopwatch for measuring time, training racket (dead) video camera for filming.
4. Abnoudi Physiological Measurements Device
5. Compression straps (for katsu training).
5. Broad jump with stability to measure the velocity characteristic strength of the legs.
6. Back muscle strength to measure the strength of the extensor muscles of the trunk (back muscles).
7. Sitting and lying down (30s) to measure the strength of the abdominal muscles.
8. Inclined prone with arms flexed (10s) to measure the velocity characteristic force of the arms and shoulders

Physiological tests:

1. Respiratory rate per minute
2. Vital capacity
3. Resting heart rate
4. Respiratory cycle endurance (Carlson's fatigue curve)

Exploratory studies:**1. The first exploratory study**

The researcher carried out a number of procedures to ensure the appropriateness of the tests under research, which resulted in what was indicated by the references, research and scientific studies, as well as the opinion of experts, the researcher conducted this study on a sample from the same research community and outside the main research sample ' This is considered an important matter to ensure accuracy in the results extracted from was conducted from 16/5/2024 to 17/5/2024 on a sample of (12) players from the same community and aims to:

1. Identify the physical and physiological tests and offensive skills used in the programme
2. Identify the tools and devices used in the tests
3. Checking the appropriateness of the data recording form for collecting the results of the application of the tests under research
4. Organise how the tests will be administered
5. Distributing tasks and training the assistants in charge of conducting the test under research

2. The second exploratory study:

The researcher conducted the second exploratory study on 19/5/2024 to 26/5/2024 on a sample of the same research community and coefficients of the tests (reliability and stability), and the second exploratory study aims to verify the scientific coefficients (reliability and stability) of the tests under research.

Validity

To find the reliability research, the reliability of using end comparison by calculating the value of the averages of the differences between the upper and lower quartiles of the results of the exploratory sample of (12) players from the research community and outside the main research sample, and Table (3) shows this.

Table 3. Significance of the differences between the upper and lower quartiles for finding differential validity in the tests under investigation

The value of 'T'	Lower Spring		Upper Spring		Unit of measure	Quizzes	Variants
	Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean			
*6.25	1.93	191.36	2.14	169.52	Second	800meters run	Physical tests
*5.36	1.47	16.47	1.63	32.52	Second	Metatarsal Stand	
*7.63	0.98	68.32	1.15	83.54	Kg	Leg Muscle Strength	
*5.94	1.53	19.74	1.69	31.24	Kg	Grip Strength Right	
*4.36	1.36	17.02	1.47	26.84	Kg	Grip Force North	
*4.97	0.86	152.47	0.84	169.74	cm	Broad jump with stability	
*3.67	1.91	44.31	1.96	53.58	Kg	Back muscle strength	
*4.02	0.80	20.23	0.74	26.97	Number of	Sitting with a recumbent 30"	
*7.93	0.69	4.91	0.63	8.04	Number of	Tilted prone 10" arm extension	Physiological variables
*3.25	0.28	17.08	0.21	21.63	Number/m inutes	Respiratory rate per minute	
*9.78	5.31	3098.17	4.93	3391.47	ml/litre	Incapacity	
*2.97	1.52	75.07	1.30	79.63	Pulse/min	Resting heart rate	
*5.07	1.03	16.78	0.75	22.63	Degree	Respiratory cyclic endurance (Carlson's fatigue curve(	

Tabular t-value at a significant level (0.05) = 3.182 * D

Table 4. Significance of the differences between the upper and lower quartiles for finding differential validity in the tests under investigation

The value of 'T'	Lower Spring		Upper Spring		Unit of measure	Quizzes	Variants
	Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean			
*4.69	0.78	2.01	0.47	5.47	Degree	T Peak Chaji Right	Offensive skills
*4.36	0.61	1.78	0.63	4.91	Degree	Tbk Chaji North	
*4.25	0.72	2.17	0.82	5.36	Degree	Mumtong Greggry in the abdomen right	
*4.98	1.03	1.97	0.95	5.63	Degree	Momtong Greggry in the abdomen North	
*5.05	0.89	2.463	1.02	6.01	Degree	Mumtong Dolio Chaji Right	
*3.62	0.61	2.73	0.74	5.96	Degree	Mumtong Dolio Chaji North	
*3.21	0.51	1.69	0.36	4.87	Degree	Mom Dulio Chaji (progressive) right	
*3.97	0.53	2.03	1.14	5.58	Degree	Mom Dolio Chaji (Progressive) North	
*3.74	1.05	2.28	1.31	5.74	Degree	Te Chaji Yemen	
*3.62	0.92	2.17	0.82	5.39	Degree	Te Chaji Shamal	
*4.01	0.42	3.10	0.47	6.19	Degree	Te Aptolio Chaji Right	
*3.98	0.91	2.09	0.33	5.57	Degree	Te Aptolio Chaji Shamal	
*3.81	0.52	2.18	0.42	5.68	Degree	Te Nara Chaji Yemen	
*4.18	1.21	1.74	1.01	5.43	Degree	Te Nara Chaji Shamal	

Tabular t-value at a significant level (0.05) = 3.182 * D

It is clear from Table 4 that there are statistically significant differences between the highest and lowest quartiles in the physical, physiological and offensive skills tests for Taekwondo players.

Stability

To find the stability coefficient of the physical, physiological and offensive skills tests for Taekwondo players, the researcher used the application and re-application method on the same sample as shown in Table (5).

Table 5. Stability coefficient by finding the correlation between the first application and re-application in the tests under research

(n=12)

Correlation coefficient value	Re-application		The first app		Unit of measure	Tests	Variants
	Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean			
0.912	2.14	179.13	2.31	180.47	Second	800 meters run	Physical tests
0.869	3.12	25.09	2.97	24.03	Second	Metatarsal Stand	
0.941	1.78	72.68	1.94	72.11	kg	Leg Muscle Strength	
0.899	2.63	25.02	2.23	24.63	kg	Right Grip Strength	
0.931	3.12	20.61	3.14	20.85	kg	Left Grip Strength	
0.913	1.32	159.74	1.21	158.96	cm	Broad Jump with Stability	
0.919	2.14	49.15	2.04	48.96	kg	Back Muscle Strength	
0.905	1.52	23.04	1.41	23.47	Number of	Sitting with Lying Down 30"	Physiological variables
0.929	1.02	6.47	0.97	6.05	Number of	Prone Leaning Arm Extension 10"	
0.917	1.24	19.63	1.35	19.88	Number/m inutes	Respiratory rate per minute	
0.821	4.78	3284.31	5.85	3210.25	ml/liter	Vital capacity	
0.928	1.96	77.63	2.03	77.94	Pulse/min	Resting heart rate	
0.947	1.57	19.78	1.23	19.84	degree	Respiratory cyclic endurance (Carlson's fatigue curve(	
0.952	1.39	3.75	1.32	3.84	degree	T Peak Chaji Right	
0.944	1.28	3.22	1.41	3.17	degree	Tbk Chaji North	Offensive skills
0.938	1.17	3.45	1.31	3.52	degree	Mumtong Greggy in the abdomen right	
0.917	1.64	2.94	1.74	3.01	degree	Momtong Greggy in the abdomen North	
0.958	0.96	2.97	0.94	2.94	degree	Mumtong Dolio Chaji Right	
0.903	0.89	3.12	0.85	2.92	degree	Mumtong Dolio Chaji North	

Correlation coefficient t value	Re-application		The first app		Unit of measure	Tests	Variants
	Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean			
0.971	0.93	3.19	1.01	3.17	degree	Mom Dulio Chaji (progressive) right	
0.947	0.77	2.91	0.63	2.98	degree	Mom Dolio Chaji (Progressive) North	
0.945	0.94	3.22	1.13	3.07	degree	Te Chaji Yemen	
0.932	1.32	3.28	1.42	3.59	degree	Te Chaji Shamal	
0.952	1.02	4.05	0.93	4.19	degree	Te Aptolio Chaji Right	
0.978	0.39	3.30	0.32	3.28	degree	Te Aptolio Chaji Shamal	
0.964	0.63	3.85	0.74	3.71	degree	Te Nara Chaji Yemen	
0.936	0.41	3.42	0.38	3.30	degree	Te Nara Chaji Shamal	

Tabular (t) value at a significant level (0.05) = 0.482 * D

It is clear from table (4) that there is a statistically significant correlation between the first application and re-application in the physical, physiological and offensive skills tests for Taekwondo players, where the calculated.

Cacio training programme

Objective of the programme:

The programme aims to develop katsu drills to improve the efficiency of some physiological physical variables and some offensive skills of young taekwondo players

Basics of building the proposed training programme:

1. Observe the principle of diversity in the performance of exercises within the training unit so that the player does not feel bored.
2. Appropriateness of the selected contents for the age group.
3. Following the principle of progression from easy to difficult and from simple to complex.
4. Guided by the results of previous studies when developing the programme.

Determine the general framework and time distribution of the proposed katsu training programme

After reviewing the references and reference studies that dealt with the design of katsu training and surveying the opinion of experts, the researcher developed a proposed katsu training programme with the aim of defining the objective of this training programme.

Table 6. Time distribution of the proposed katsu training programme

Temporal distribution	Content	t
8weeks	Programme duration in weeks	1
2phases	Programme phases	2
4weeks	Number of weeks per phase	3
3modules	Number of training modules per week	4
24modules	Total number of modules in the proposed	5
Phase I (40%: 60%)(	training programme Appropriate load in the proposed training programme	6
Phase III (60%: 90%)(		

Steps to build the proposed katsu training programme

The researcher built the proposed CATSIO training programme through:

Reference Studies Framework

Through the researcher's frame of reference studies from references, research and training programmers developed by researchers, and what was obtained from the information, references, research, Arab and foreign reference studies in this field, which dealt with CATSIO training, where criteria and foundations for the proposed CATSIO training programme were developed.

Expert Opinion Survey:

The expert opinion survey form was designed by the researcher and presented to a group of professors specialized in physical education to select the best and most appropriate basis for building the proposed CATSIO training programme in the training of players as well as the importance of the role of exercises using CATSIO by using the procedures of the experts in everything related to the scientific bases for the design of the proposed CATSIO training programme.

Based on the opinion of the experts, the researcher determined the following:

1. Determining the appropriate load for each player individually, which follows the principle of individual differences and his training age.
2. The total time period of this programme is (24) training units during (8) weeks.
3. The number of units per week (3) training units.
4. The time of the training unit (75) minutes, depending on the stage implemented.
5. Gradual progression of katsu training from easy to difficult.

Annex (1) shows the method of performing katsu training

Table 7. Sample training module for the experimental group using katsu training

Unity goal: Tebek Chagi		
2024/6/1	Date:	Improved range of motion with neuromuscular alignment of the arms and legs
75minutes	Time:	
Density	Size	Intensity

Between iterations	Between Groups	Between iterations	Between Groups	For the skill	Components of pregnancy training
---	10second	8-6	5-3	%65	
Performance time	Content			Parts	
10 mines	Stretching for all parts of the body			Warm-up	
20 mines	strength-endurance-agility-speed-flexibility compatibility-balance-			Physical Preparation	
20 mines	T-Peak Chagi Workout			Main Part	
20 mines	T-Peak Chagi Workout with Katsu				
5 mines	Vertical Weighted Stretching			Closing	

The main experiment:

1. Tribal measurements:

The researcher conducted tribal measurements from 28/5/2024 to 29/5/2024 on the research sample (12) Taekwondo players.

2. Applying the main research experiment:

The researcher implemented the proposed programme using katsu training on the experimental research sample (12) players from 1/6/2024 to 30/7/2024.

3. Dimensional measurements:

The researcher carried out the dimensional measurements from 1/8/2024 to 2/8/2024 on the experimental research sample of (12) Taekwondo players.

Statistical treatments used in the research:

The researcher used the following statistical method to process the data through the statistical programme (SPSS) to find the following:

- ♣ Arithmetic mean.
- ♣ Standard Deviation.
- ♣ Median.
- ♣ Torsion coefficient.
- ♣ Flattening coefficient.
- ♣ Test (t)
- ♣ Pearson correlation coefficient
- ♣ Frequency and percentage.

Result and Discussion

Presentation and discussion of the results of the first hypothesis, which states that "there are statistically significant differences between the two measurements (pre and post) of the experimental group for the physical variables of young taekwondo players in favour of the post measurement".

Table 8. Significance of statistical differences for the t-test between the pre and post measurements in the physical tests of young Taekwondo players

(n=12)

Signifi cance level	Value (T)	Experimental group				Unit of measure	Statistical data Tests
		Dimensional measurement		Tribal Measurement			
		Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean		
0.00	*4.69	2.87	177.36	2.64	182.64	second	800meter run
0.00	*13.97	3.09	39.74	3.90	23.87	second	Metatarsal standing
0.00	*10.33	1.54	84.97	2.07	72.69	kg	Leg muscle strength
0.00	*6.78	1.47	31.54	1.79	25.01	kg	Right grip strength
0.00	*7.94	2.94	28.67	2.43	21.47	kg	Left grip strength
0.00	*18.90	1.36	194.38	0.87	169.74	cm	Broad jump with stability
0.00	*12.25	1.74	67.08	2.33	46.85	kg	Back muscle strength
0.00	*3.75	0.84	29.78	1.25	22.07	Number of	Sitting with kneeling 30"
0.00	*3.47	0.66	8.97	0.78	5.47	Number of	Inclined prone bent arms 10"

The value of (t) at the significance level (0.05) = 2.201

It is clear from the results of Table (8) that there are statistically significant differences at the level of (0.05) between the mean scores of the pre and post measurements of the experimental group in favor of the mean of the post measurement in physical tests, as the calculated 't' value ranged between (3.47: 18.90).

In this regard, the results of the study of Ashraf Mustafa Ahmed (4, Ashraf, 2020)" Katsuyo training resulted in strength endurance of the legs and arms, muscular capacity and transitional speed in Taekwondo players, and Katsuyo training resulted in the development of skill performance in the young Taekwondo players.

Presentation and discussion of the results of the second hypothesis, which states that "there are statistically significant differences between the two measurements (pre and post) of the experimental group on the physiological variables of young taekwondo players in favor of the post-measurement".

Table 9. Significance of statistical differences for the t-test between the pre and post measurements in the physiological variables of young Taekwondo players

(n=12)

Significance level	Value (T)	Experimental group				Unit of measure	Statistical data
		Dimensional measurement		Tribal Measurement			
		Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean		
0.00	4.63	0.94	16.47	1.54	20.21	Number/minutes	Respiratory rate per minute
0.00	18.74	3.62	3397.97	4.17	3128.64	ml/litre	Vital capacity
0.00	7.05	0.82	70.41	1.07	78.91	Pulse/minute	Resting heart rate
0.00	11.20	1.41	12.81	1.58	18.47	Degree	Respiratory cyclic endurance (Carlson's fatigue curve)

The value of (t) at the significance level (0.05) = 2.201

It is clear from the results of Table (9) that there are statistically significant differences at the level of (0.05) between the mean scores of the pre and post measurements of the experimental group in favor of the mean of the post measurement in physiological measurements of young taekwondo players, where the calculated "t" value ranged between (4.63: 18.74).

In this regard, the results of the study of Apiwan Manimmanakorn et al. (10, Manimmanakorn, 2013) confirmed that low-intensity resistance training at 20% of 1RM with restricted blood flow contributes to the development of muscular strength and endurance and can benefit from its application over traditional training methods.

Presentation and discussion of the results of the third hypothesis which states that "there are statistically significant differences between the two measurements (pre and post) of the experimental group in some offensive skills of young Taekwondo players in favor of the post-measurement".

Table 10. Significance of statistical differences for t-test between pre and post measures in offensive skills of young taekwondo players

(n=12

Significance level	Value (T)	Experimental group				Unit of measure	Statistical data Tests
		Dimensional measurement		Tribal Measurement			
		Standard Deviation	The arithmetic mean	Standard Deviation	The arithmetic mean		
0.00	8.94	0.99	8.54	1.25	4.02	degree	T Peak Chaji Right
0.00	7.69	1.21	7.69	1.36	3.14	degree	Tbk Chaji North
0.00	12.64	1.13	7.14	0.89	3.65	degree	Mumtong Greggry in the abdomen right
0.00	8.04	0.76	6.95	0.47	2.97	degree	Momtong Greggry in the abdomen North
0.00	9.57	0.64	6.58	0.59	3.95	degree	Mumtong Dolio Chaji Right
0.00	11.18	1.08	7.08	1.12	3.22	degree	Mumtong Dolio Chaji North
0.00	6.02	1.28	6.98	1.17	3.05	degree	Mom Dulio Chaji (progressive) right
0.00	13.97	0.58	6.54	0.81	2.69	degree	Mom Dolio Chaji (Progressive) North
0.00	10.41	0.63	7.73	0.74	3.28	degree	Te Chaji Right
0.00	14.34	1.14	8.15	0.69	3.54	degree	Te Chaji Right
0.00	13.38	0.86	8.32	1.11	4.14	degree	Te Aptolio Chaji Right
0.00	5.57	0.97	6.47	1.32	3.72	degree	Te Aptolio Chaji left
0.00	7.19	1.36	7.50	1.45	3.36	degree	Te Nara Chaji Right
0.00	6.34	1.39	7.91	1.16	3.29	degree	Te Nara Chaji left

The value of (t) at the significance level (0.05) = 2.201

In this regard, the results of the study of Nabil Hamed Shaheen (9, Nabil, 2018) confirmed the existence of statistically significant differences at a significant level of 0.5 between the averages of the premeasurement and post measurement of the research sample in most of the research variables, which indicates that these differences between the two measurements are real and not due to chance, and these differences are in favor of the

dimensional measurements, and the improvement rates are in favor of the dimensional measurements.

Conclusion

1. Katsyu training improved physical abilities (800 meters run, standing on the instep, leg muscle strength, left and right grip strength, broad jump with stability, back muscle strength, sitting with 30" lying down, prone, arms bent 10"). For young Taekwondo players
2. Katsuyo training improves physiological variables (respiratory rate per minute, vital capacity, resting heart rate, respiratory cyclic endurance). For young Taekwondo players
3. Katsuyo training has improved some offensive skills (T Peak Chaji right and left, Momtong Greggry in the abdomen right and left, Momtong Dolio Chaji right and left, Mom Dolio Chaji right and left, Mom Dolio Chaji (gradual) right and left, T Chaji right and left, T Aptolio Chaji right and left, T Nara Chaji right and left) for young Taekwondo players.

Recommendations:

Within the limits of the study sample and based on the researcher's findings, the researcher can recommend the following:

1. using katsu training to develop the offensive skills of taekwondo players
2. using katsu training to develop the physical and physiological abilities of taekwondo players
3. conducting more studies on the effect of katsu training on other samples
4. providing sports facilities with modern laboratories and equipment to benefit from them when developing, planning, following up, evaluating and modifying training programmers.
5. Opening new horizons and conducting other research to know the effect of katsyu training on the skill level of other sports.
6. To guide coaches to use Katsyu training in the development of training programmers for different age groups in Taekwondo.

Annex1

KAATSU NANO, Sato-Plaza, Tokyo, Japan

It is a device invented by Japanese scientist Yoshiaki Sato in 2001, and the idea of the device's work comes through the four main veins in the upper (top of the brachial muscle) and lower body (meeting the muscles of the thigh and pelvis), using calibrated elastic bands, which calculate the value of the venous pressure of blood returning to the heart from the limbs and muscles.

Components of the device:

- ♣- A hardware receiver loaded with KAATSU software to calculate the time and enter each player's training data, as well as calculate the restriction value in mmHg
- ♣- A number of elastic bands for the arms and legs have been previously calibrated to allow correct blood flow restriction without risk to the player.
- ♣- A flexible tube that allows the ligature to swell, gives the start signal and connects the ligature to the device.

Third: Instructions for use.

- ♣ The trainer or specialist in katsu training should charge the device well before use and make sure there is no air inside the elastic bands.
- ♣ The trainer connects the rubber tube between the device and the elastic bands and makes sure the safety button is in place.
- ♣ After warming up the players, the trainer places the bands on top of the thigh muscle and makes sure that the device mark appears on the front face of the band on the player's thigh.
- ♣ The trainer calculates the real value of the restriction that suits the player through the initial detection of the device, which is automatically calculated by the system used on the device.
- ♣ The user asks the player for three very important signs without which the restriction process is incomplete:
 - First: Do you feel any pulsation under the elastic band?
 - Second: Do you feel the skin turn a light pink color?
 - Third: Do you feel any pain or discomfort?

The answer to questions (1 and 2) must be 'yes' for the restraint to be 100% correct.

- ♣ The exercises given are rationed so that the degree of load does not exceed 30% to 40% of the normal degree of load, and the volume of performance for the legs or arms does not exceed 25 minutes.

Method of recording:

The rate of restriction is recorded for each player in each unit, to give an indication of the adaptation of the veins to this, and it is possible that the restriction in each unit may differ from the other unit.

After the exercise, the player is asked how he/she feels and whether there are any unusual symptoms.

Annex 2. Sample training module for the experimental group using katsu exercises

Unity goal: Tebek Chagi					
2024/6/1	Date:	Improved range of motion with neuromuscular alignment of the			
75minutes	Time:	arms and legs			
Density		Size		Intensity	Components of pregnancy training
Between iterations	Between Groups	Between iterations	Between Groups	For the skill	

Unity goal: Tebek Chagi				
2024/6/1	Date:	Improved range of motion with neuromuscular alignment of the		
75minutes	Time:	arms and legs		
---	10second	8-6	5-3	%65
Performance time	Content			Parts
10 mines	Stretching for all parts of the body			Warm-up
20 mines	strength-endurance-agility-speed-flexibility compatibility-balance-			Physical Preparation
20 mines	T-Peak Chagi Workout			
20 mines	T-Peak Chagi Workout with Katsu			Main Part
5 mines	Vertical Weighted Stretching			Closing

References

- Ahmed, A. M. (2020). The effect of katsu training on some physical variables and the level of performance of the three-point shot in junior basketball in the State of Kuwait, published research, Practical Journal of Physical Education, Faculty of Physical Education, Helwan University
- Al-Gharbawi, M. M. T. (2007). A training programme using different methods to develop muscular strength and its effect on taekwondo players' straight back kick performance - Doctoral Thesis - Faculty of Physical Education - Tanta University.
- Bae, J.S. (2021). Examining the role of life skills in mediating the relationship between the basic psychological needs and subjective well-being of taekwondo student-athletes. *International Journal of Environmental Research and Public Health*, 18(21), ISSN 1661-7827, <https://doi.org/10.3390/ijerph182111538>
- Fattah, A. A. (2003): Physiology of Training and Sport, Reference Series in Physical Education and Sport, 1st edition, Dar Al-Fikr Al-Arabi, Cairo.
- Flocco, P. (2021). Effect of blood flow restriction training on physiological outcomes in healthy athletes: A systematic review and meta-analysis. *Muscles, Ligaments and Tendons Journal*, 11(1), 101-117, ISSN 2240-4554, <https://doi.org/10.32098/mltj.01.2021.12>
- Heshmat, H. & Mohamed, M. S. (2018). Biology of Sport and Health, The Book Centre for Publishing, First Edition, Cairo.
- Januário, M. (2019). Effects of Self-Controlled Knowledge of Results on Learning a Taekwondo Serial Skill. *Perceptual and Motor Skills*, 126(6), 1178-1194, ISSN 0031-5125, <https://doi.org/10.1177/0031512519869086>
- Kim, T. (2020). The effect of alternate training of action observation and motor imagery on cognitive and skill performance. *International Journal of Sport Psychology*, 51(2), 101-121, ISSN 0047-0767, <https://doi.org/10.7352/IJSP.2020.51.101>

- Manimmanakorn, A., Hamlin, M. J., Ross, J. J., Taylor, R., & Manimmanakorn, N. (2013). Effects of low-load resistance training combined with blood flow restriction or hypoxia on muscle function and performance in netball athletes. *Journal of Science and Medicine in Sport*, 16(4), 342-337
- Monz, A. (2023). Mutual interference between memory encoding and motor skills: the influence of motor expertise. *Frontiers in Psychology*, 14, ISSN 1664-1078, <https://doi.org/10.3389/fpsyg.2023.1196978>
- Mulyana, F.R. (2024). The Influence of Cooperative Learning Models and Learning Styles on Social Skills in University Student. *International Journal of Disabilities Sports and Health Sciences*, 7, 9-18, ISSN 2645-9094, <https://doi.org/10.33438/ijdshs.1368958>
- Nam, J.H. (2022). Sport Psychological Skill Factors and Scale Development for Taekwondo Athletes. *International Journal of Environmental Research and Public Health*, 19(6), ISSN 1661-7827, <https://doi.org/10.3390/ijerph19063433>
- Nour, A. T. (2013). Competition Rules and Interpretation - World Taekwondo Federation - Cairo (Translation).
- Ross, R. (2018). Mysterious Training or Kaatsu: What It Is and How to Do It Right.
- Shahin, N. H. (2018). The effect of Pilates training on improving the performance level of some offensive skills of Taekwondo players", Master Thesis, Faculty of Physical Education for Girls, Alexandria University
- Sukkari, K. I. & Brega, M. J. (2001). Integrated training series for making a champion 6-18 years old, Part I - Maarifa facility - Alexandria
- Takano, H., Morita T., Lida, H., Asada, K., Kato, M., Uno, K., Hirose, K., Matsumoto A., Takenaka, K., Hirata, Y., Eto, F., Nagai, R., Sato, Y., NakaJima. (2005), The effect of oklagon exercise on physical variables
- Takarada, Y., Sato, Y., & Ishii, N. (2015). Effects of resistance exercise combined with vascular occlusion on muscle function in athletes. *European Journal of Applied Physiology*, 86, 314-308.
- Zahran, A. S. (2004): Scientific and Technical Rules of Taekwondo - Faculty of Physical Education for Boys - Helwan University.
- Zahran, A. S., & Mehran, I. (2016). The effectiveness of offensive skills of world-class players in Taekwondo, published research - Faculty of Physical Education for Boys - Helwan University.