

Circuit Body Weight Training for Karate Athletes (Kumite - Under 21 Years): How is the Effect and Correlation on Weight Loss and Kizami - Gyaku Zuki?

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Abstract

The aim of this study was to analyze the effect of circuit body weight training on weight loss and Kizami - Gyaku Zuki's punching skills. The sample of 21 karate athletes aged 17 – 20 years consisted of men: -60 kg, -67 kg, -75 kg, -84 kg, height 167 – 178 cm; and women: -50 kg, -55 kg, -61 kg, height 162 – 170 cm. The body weights in this study were adjusted to the 2024 World Karate Federation (WKF) regulations. However, not all samples could fill all weight classes according to the WKF regulations. The training program is carried out for 4 weeks or 12 meetings, with 3 meetings in one week. This exercise is carried out with an intensity of 50 – 70%, number of sets 3 – 5 sets, number of repetitions 14 – 18 times, recovery between posts is 20 seconds, recovery between sets 120 – 180 seconds. The results of this research are that circuit body weight training has an effect on weight loss and kizami - gyaku zuki punches (sig. $0.000 < 0.05$). Then the product moment correlation shows a strong relationship, with a sig value. 0.017 ($r = -626$) means that the more the athlete's weight increases, the kizami – gyaku zuki punching skill decreases. Variables in body weight and kizami - gyaku zuki skills are very important for a fighting athlete, especially kumite, to be able to compete in the specified class. This research can be recommended for athletes who have a short general preparation period, because this program is only carried out for 4 weeks with 3 meetings in one week.

Keywords: Circuit Training, Karate, Weight Loss, Kizami - Gyaku Zuki.

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INTRODUCTION

Karate is a martial arts sport that originates from Japan and is a sport that is competed in the Olympics. In karate martial arts, there are two categories of competition, namely *kumite* and *kata* [1]. *Kumite* is defined as two people practicing in pairs or facing each other in an arena (*tatami*). In its development, kumite can be used as a competition to measure an athlete's ability to show their best techniques - tactics with the aim of getting points from attacks on the opponent, but still adhering to strict rules [2]. Several basic techniques are taught in *kumite*, one of which is punching. The punches in karate that are generally used during *kumite* in competitions are *kizami* and *gyaku zuki* [3]. *Kizami* is a front hand punch, while *gyaku zuki* is a reverse or back hand punch.

Factors that influence power in a punch are the strength and speed possessed by an athlete [4, 5]. The

strength of a karate athlete in the *kumite* category can be measured through a muscle strength test. The greater the strength a *kumite* athlete has, the greater the power produced [6, 7]. Apart from that, another factor that influences the strength of karate athletes is body weight [8]. Combat sport competitions in the fighting category must pass a body weighing test to determine the competition class the athlete will take part in. An athlete's weight can have a fatal effect on the athlete who receives a punch from an opponent [9].

The heavier the athlete's body, the greater the power produced, then if done quickly and suddenly, it can cause the opponent to knock out [10, 11]. However, to be able to knock out an opponent or gain points in a kumite match, athletes must go through a systematic and measurable training program and develop innovations so that their technique, tactics, physical and mental abilities can be superior to their opponents [12, 13]. Then, facts

on the ground show that karate athletes in the *kumite* category are still unable to maintain their weight, so they require athletes to lose weight first.

In general, body weight greatly influences the level of ability of martial arts athletes in the fighting category in demonstrating their technical and tactical skills. Based on research results in the sports of karate, judo and taekwondo, it shows that body weight affects mobility when fighting, whereas in judo it can affect the technique for slamming an opponent [14]. In addition, greater body weight greatly influences the level of damage received, as well as lighter body weight having an advantage in terms of agility [15].

The aim of the research was to analyze the effect of the training program on *kizami – gyaku zuki* punching skills as well as the reduction in body weight of athletes who did not match the competition class. This training program is adopted from a training program using the athlete's own body weight and is carried out in a circuit. General scientific results reports explain that circuit training has many advantages in improving athletes' physical components [16-19]. Then, the novelty in this research is from the results of previous research, namely testing the level of relationship between *kizami - gyaku zuki* punches and the body weight of *kumite* athletes. Apart from that, there is no research that discusses this problem so that with its publication this research can provide a reference for karate sports academics, coaches and athletes.

METHODS

Research Design

This type of research is an experimental study with *one group pretest - posttest*. The test used in this research was karate athletes in the *kumite* category. Athletes were asked to carry out a body weighing test and punch *kizami – gyaku zuki* for 30 seconds on a bag. Tests were carried out before and after on athletes who were given treatment.

Research Sample

This research offers karate athletes the *kumite* category voluntarily, provided that they are not injured and are not currently taking part in a competition period. So the sample involved in this study was 21 athletes. Apart from that, the sample was a trained athlete, had at least a regional champion, and the belt level was black belt DAN 1. The body weight in this study was adjusted to the 2024 World Karate Federation (WKF) rules for the *kumite* category with the sample age being 17 – 20 years. However, not all samples could fill all weight classes according to WKF rules, so the 21 samples of karate athletes consisted of men: -60 kg, -67 kg, -75 kg, -84 kg, height 167 – 178 cm; and women: -50 kg, -55 kg, -61 kg, height 162 – 170 cm.

Training Program

The training program is carried out for 4 weeks or 12 meetings, with 3 meetings in one week. This exercise is done with an intensity of 50 – 70% and with a fast rhythm. This type of training in the bodyweight circuit is adopted from several previous studies which are considered relevant to the use of muscles in the *kumite* category of karate [20, 21]. The following is a training program (Table 1).

Table 1: Training Program

Pos	Type of Exercise		Target of Exercise	
1	Shoulder Tapping Push Up		Chest	
2	Inchworm to Side Plank		Core	
3	Reclining Circle		Stomach	
4	Reclining Triceps Press		Arms	
5	Lateral Plyo Squat		Limbs	
6	Slide Out		Back	
7	Floor Inverted Shoulder Press		Shoulders	
8	Plank with Leg Lift		Core	
9	Reverse Crunch		Stomach	
10	Single-Leg Dip		Shoulders	
11	Split Jacks		Limbs	
12	Back Extension with Opposite Arm and Leg Reach		Back	
Meeting	Sets	Repetition	Recovery between posts	Recovery between set
1 - 4	3	14	20 seconds	120 seconds
5 - 8	4	16	20 seconds	130 seconds
9 - 12	5	18	20 seconds	180 seconds

RESULT

Descriptive Analysis

The following are the results of a descriptive analysis of circuit bodyweight for 12 meetings on the weight loss of karate athletes in the kumite category - under 21 years (Table 2).

Table 2: Descriptive Analysis

Gender	Weight	Test	N	Minimum (kg)	Maximum (kg)	Mean (kg)	Std. Deviation
Male	-60 kg	Pretest	3	63.1	64.7	64.2	4,163
		Posttest	3	59.2	60.7	59.8	7,937
		Average				4.4	
	-67 kg	Pretest	3	70.2	71.5	70.7	7,000
		Posttest	3	66.8	67.3	67.0	2,517
		Average				3.7	
	-75 kg	Pretest	3	78.4	79.6	79.0	9,018
		Posttest	3	74.4	76.3	75.3	9,644
		Average				3.7	
	-84 kg	Pretest	3	87.8	88.4	88.1	6,028
		Posttest	3	82.9	84.3	83.4	9,539
		Average				4.7	
Female	-50 kg	Pretest	3	51.5	52.7	52.1	6,000
		Posttest	3	49.8	50.8	50.2	5,033
		Average				1.9	
	-55 kg	Pretest	3	56.9	57.7	57.2	4,163
		Posttest	3	54.1	55.3	54.7	6,000
		Average				2.5	
	-61 kg	Pretest	3	62.7	63.3	63.0	3,000
		Posttest	3	59.2	60.0	59.5	4,163
		Average				3.5	

Based on the results of table 2 for men, the average weight loss in the -60 kg class is 4.4 kg, the average weight loss in the -67 kg class is 3.7 kg, the average weight loss in the -75 kg class is 3.7 kg, the average weight loss for the -84 kg class is 4.7 kg.

Then for female, the average weight loss in the -50 kg class was 1.9 kg, the average weight loss in the -

55 kg class was 2.5 kg, the average weight loss in the -61 kg class was 3.5 kg.

Results of descriptive analysis of circuit bodyweight for 12 meetings on *kizami - gyaku zuki* punches for 30 seconds by karate athletes in the kumite category - under 21 years (Table 3).

Table 3: Descriptive Analysis

Gender	Weight	Test	N	Minimum	Maximum	Mean	Std. Deviation
Male	-60 kg	Pretest	3	36	38	37	1,000
		Posttest	3	46	47	46.6	,577
	-67 kg	Pretest	3	31	35	32.6	2,082
		Posttest	3	42	45	43	1,732
	-75 kg	Pretest	3	28	33	30.3	2,517
		Posttest	3	39	42	40	1,732
-84 kg	Pretest	3	26	27	26.2	,577	
	Posttest	3	33	34	33.6	,577	
Female	-50 kg	Pretest	3	29	32	30.6	1,528
		Posttest	3	40	43	41.6	1,528
	-55 kg	Pretest	3	28	31	29.3	1,528
		Posttest	3	40	41	40.3	,577
	-61 kg	Pretest	3	28	31	29.6	1,528
		Posttest	3	39	41	40	1,000

Based on the results of table 3 for male athletes, the average number of *kizami - gyaku zuki* for 30 seconds in the -60 kg class namely pretest 37 punches and posttest

46 punches, class -67 kg namely pretest 32 punches and posttest 43 punches, class -75 kg namely pretest 30

punches and posttest 40 punches, class -84 kg namely pretest 26 punches and posttest 33 punches.

Then in the female athletes, the average number of *kizami - gyaku zuki* for 30 seconds in the -50 kg class namely pretest 30 punches and posttest 41 punches, class

-55 kg namely pretest 29 punches and posttest 40 punches, class -61 kg namely pretest 29 punches and posttest 40 punches.

Normality Test

Table 4: Normality Test

Variables	Test Result	Shapiro-Wilk		
		Statistic	df	Sig.
Athlete's Weight	Pretest	0,768	21	0,093
	Posttest	0,769	21	0,082
Kizami-Gyaku Zuki	Pretest	0,636	21	0,101
	Posttest	0,777	21	0,087

Based on table 4, the results of the normality test using Shapiro-Wilk on the athlete's weight variable show a pretest significance value of $0.093 > 0.05$ and a posttest significance value of $0.082 > 0.05$. It can be concluded that the data on the weight variable is normally distributed.

Then, the results from *kizami - gyaku zuki* showed a pretest significance value of $0.101 > 0.05$ and a posttest significance value of $0.087 > 0.05$. It can be concluded that the data on the *kizami - gyaku zuki* skill variable is normally distributed.

Homogeneity Test

Table 5: Homogeneity Test

Test of Homogeneity of Variances						
			Levene Statistic	df1	df2	Sig.
Athlete's Weight	Pre_Post_Test	Based on Mean	1,891	2	39	0,123
Kizami-Gyaku Zuki	Pre_Post_Test	Based on Mean	1,684	1	40	0,177

Based on table 5, the results of the homogeneity test on the athlete's weight variable show a significance value of $0.123 > 0.05$ and the *kizami - gyaku zuki* hitting

skill variable shows a significance value of $0.177 > 0.05$, so these two variables come from the same population.

T Test

Table 6: T Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Athlete's Weight	Pre - Post	66,014	1,320	1,720	53,708	69,242	11,725	20	0,000
Kizami-Gyaku Zuki	Pre - Post	35,764	6,014	5,092	47,072	79,964	15,326	20	0,000

Based on table 6, the results of the pretest and posttest t test after being given body weight circuit training for 4 weeks on the weight variable show a sig value. $0.000 < 0.05$, meaning that there is a significant influence on the decline in karate athletes in the *kumite* category under 21 years. Then the results of the pretest and posttest t-test on the *kizami - gyaku zuki* hitting skill

variable for 30 seconds showed a sig value. $0.000 < 0.05$, meaning that there is a significant influence on the striking skills of *kizami - gyaku zuki* karate athletes in the *kumite* category under 21 years.

Product Moment Correlation

Table 7: Product Moment Correlation

Correlations			
		Athlete's Weight	Kizami-Gyaku Zuki
Athlete's Weight	Pearson Correlation	1	-0,626
	Sig. (2-tailed)		0,017
	N	42	42
Kizami-Gyaku Zuki	Pearson Correlation	-0,626	1
	Sig. (2-tailed)	0,017	
	N	42	42

The correlation analysis of this research combines the results of the pretest and posttest on the variables of athlete's weight and *kizami - gyaku zuki* skills for 30 seconds. Based on the results from table 7, athlete's body weight correlates with *kizami - gyaku zuki* skills in karate athletes in the *kumite* category under 21 years with a significance value of $0.017 > 0.05$. Then the direction of the correlation is negative ($r = -0.626$), it can be concluded that the more the athlete's weight increases, the *kizami - gyaku zuki* skills decrease.

DISCUSSION

Circuit training is a training program that is often used for training in all types of sports with the aim of improving athletes' abilities. The results of this study show that circuit training can influence weight loss in karate athletes in the *kumite* category under 21 years. These results are also in line with previous research reports on weight loss using circuits, explaining that weight loss is effective over a long duration and moderate to high intensity [22, 23]. Then, weight loss also has an impact on athletes' physiology. These physiological impacts include increased cardiorespiratory ability and red blood cells [24-26]. Apart from these results, it will affect the endurance level of karate athletes, so that they do not get tired easily so they can display technical and tactical skills during *kumite* matches. Therefore, the results of circuit body weight training are not only effective for losing weight, but also have a role in endurance ability [27]. So these results affect the performance of karate athletes' skills such as hitting, kicking and parrying attacks.

Then circuit body weight training is also effective for improving *kizami - gyaku zuki* skills in *kumite* athletes under 21 years old. Previous research reports that training using circuits can improve the physical components of karate athletes in terms of agility, strength and endurance [28, 29]. This physical component has a strong relationship to technical skills in karate, such as punching, kicking and parrying. Because in a *kumite* match, an athlete must first score points quickly, so good physical components are needed [30, 3]. Apart from that, to maximize the physical component, if the athlete is overweight it will be difficult to increase, which will affect the quality of the karate athlete's technique and tactics during *kumite*.

The correlation results also show that if the skill of *kizami - gyaku zuki* punches increases then the body weight of a *kumite* athlete must be ideal. Then the results of the pretest and posttest in the weight class showed that the higher weight class showed less results compared to the lower weight class. These results prove that body weight can affect athletes' movement and physiological abilities such as fitness [14, 31]. However, in losing weight other factors must also be considered, especially the athlete's motivation. With strong motivation, the opportunity to achieve achievement will be great because it is based on a long training process, of course supported

by quality service [32-34]. Then the quality and competence of the trainer also influences the preparation and determination of training programs, because the variable in this research is punching technique, so good technique will also influence effective and efficient movement [35, 36].

The limitation of the research is that there has not been a large weight class found in accordance with the World Karate Federation (WKF) regulations in 2024, because it is very rare for karate athletes in the under 21 *kumite* category to weigh more than 84 kg in male athletes and weigh more than 67 kg in athletes woman. So it is hoped that this research can become the basis for further research on senior category karate athletes. The results of this research can be recommended for athletes who have a short general preparation period, because this program only runs for 4 weeks with 3 meetings a week. Apart from that, it is necessary to analyze the results of circuit body weight training with expanded variables such as agility and power, because these variables are very closely related to the *kumite* category.

CONCLUSION

Circuit body weight training is an effective training method for improving physical abilities and reducing weight for karate athletes, especially in the under 21 years old *kumite* category. Training for 4 weeks with 3 meetings in one week, was able to reduce the athlete's weight and improve *kizami - gyaku zuki* skills. Then the correlation analysis shows that large body weight will affect the hitting skills of *kizami - gyaku zuki*. This means that the lighter the athlete's weight or less, the more the frequency of punches on the *kizami - gyaku zuki*. Variables in body weight and *kizami - gyaku zuki* skills are very important for a fighting athlete, especially *kumite*, to be able to compete in the specified class. This research can be recommended for athletes who have a short general preparation period, because this program is only carried out for 4 weeks with 3 meetings in one week.

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