

The Effect of 8 Weeks of Training with Resistance Band on Limb Power of Taekwondo Athletes



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ABSTRACT: The purpose of this study was to determine the effect of 8 weeks of training with resistance bands on the leg power of taekwondo athletes. This type of research is an experiment. The sample used was taekwondo athletes totalling 27 athletes with an age range of 14-17 years. The leg power test instrument uses a vertical jump. Data analysis techniques include descriptive analysis, prerequisite tests (normality and homogeneity tests), and hypothesis testing using paired sample tests. Analysis using the help of SPSS 23 software. The results showed that eight weeks of training with resistance bands was significant for increasing the leg power of taekwondo athletes. The increase in leg power of taekwondo athletes after being given eight weeks of training with resistance bands was 3.31%. For further research, it is hoped to further expand the scope of the study by examining other factors that influence increasing leg muscle power, as well as developing the research sample.

KEYWORDS: 8 weeks workout, resistance bands, leg power

INTRODUCTION

Taekwondo is one of the sports that are of concern to the authors in this study. Taekwondo competitions are divided into two numbers: poomsae and kyorugi (Wirya et al., 2021). Poomsae is the art of demonstrating movements in taekwondo. In this number, each athlete tries to play one or two moves in turn and where the athlete who succeeds in having the highest accumulated score will be the winner (Koshcheyev, 2019). Kyorugi is a fight between two taekwondo where they attack each other and defend themselves while protecting themselves from attacks by using kick, block and punch techniques in the taekwondo (Tirtawirya et al., 2017).

Taekwondo is a martial art that uses many techniques; one of the techniques that need to be strengthened is kicks. One of the things that Taekwondoin often does to get points is to do a series of kicks. Kicks that are capable of producing points must have enough power. The kicking technique in Taekwondo is greatly influenced by the quality of the athlete's leg muscle power. Leg muscle power is the ability of a person to maximize strength and speed to overcome resistance or load (Aloui et al., 2019); (Rodriguez-Lopez et al., 2022). Power is the product of strength and speed (Pereira et al., 2020).

To get good power abilities, you have to do structured and continuous training. Training is the process of carrying out sports activities based on systematically arranged training programs, aiming to improve the ability of athletes in an effort to achieve the maximum possible performance, especially carried out in preparation for a competition (Pisapia & D'Isanto, 2018). Therefore the provision of training that is applied to athletes is very appropriate when prioritizing leg power. Many studies use training methods to increase power, but weight training can also be used to increase an athlete's power.

The training method is not only chosen by the coach appropriately, but the training method must evaluate the athlete's shortcomings. One method that will be applied in this research is resistance bands. In recent years, one that has become widely accepted in training programs around the world is the resistance band combination added to free weight training (Shavelson, 2018); (Ghram et al., 2021). Before using this resistance band, it is best to ensure that the condition of the elastic rubber does not break during use, because if it is cut, it can endanger safety. In addition, it must also be ensured that the pivot point where the resistance band is tied must be strong, so that the exercise can be carried out comfortably and safely.

This exercise using resistance bands is an alternative to weight training using rubber or elastic cables as resistance (Bergquist et al., 2018); (Souto et al., 2021). Rubber resistance bands have various elasticities, in this study medium-sized resistance bands can be used for strength training. In the field there are still many coaches who do not know the form of power training using rubber resistance bands. The combination of resistance band exercises is very effectively used to increase jump height and leg strength, increase speed, and agility (Katushabe & Kramer, 2020); (Aloui et al., 2020); (Agopyan et al., 2018); (Hammami et al., 2021).

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Elastic bands can strengthen certain muscle groups and affect flexibility and balance (Oh, 2021). In addition, exercises using resistance bands can also increase joint strength and can be used for aerobic exercise. The results of the study (Liao et al., 2018) that Elastic band resistance training has a significant beneficial effect on muscle mass, muscle quality, and physical function in older women with obesity. Similar results were found for muscle quality, physical capacity, and physical function outcomes. Based on the observation results, it was found that leg power was still relatively lacking. It can be seen empirically that the kicks performed in several competitions are still very weak. This shows that leg power is still low. In the Kyorugi competition, athletes who have good kick power will be more profitable in getting points in the competition. Therefore training with an important technical approach is given. A creative trainer must have expertise in choosing the right method and form of training and according to the needs of athletes. Therefore, this study aims to determine the effect of 8 weeks of training with resistance bands on the leg power of taekwondo athletes.

METHOD

This type of research is an experiment. Experimental research is research conducted to find out the consequences of a treatment given intentionally by researchers (Rogers & Revesz, 2019). The population as well as the sample used were taekwondo athletes totaling 27 athletes with an age range of 14-17 years. Instruments to measure leg power using a vertical jump with units of centimeters. Data analysis techniques include descriptive analysis, prerequisite tests (normality and homogeneity tests), hypothesis testing using paired sample tests and independent sample tests. Analysis using the help of SPSS 23 software. An 8-week training program with resistance bands on the leg power of taekwondo athletes is presented in Table 1.

Table 1. Resistance Band Exercise Program

Practice	Intensity	Set	Repetition	Recovery	Interval
1-6	40%	5 set	5x	25 seconds	1.5 minute
7-12	50%	5 set	6x	25 seconds	1.5 minute
13-18	60%	5 set	7x	25 seconds	1.5 minute
19-24	70%	5 set	8x	25 seconds	1.5 minute

FINDING

The research process was carried out for 18 meetings for 8 weeks. The results of the descriptive statistical analysis of the pretest and posttest leg power of taekwondo athletes are presented in Table 2.

Table 2. Results of Descriptive Analysis of VO₂Max Pretest and Posttest Statistics

Data		N	Minimum	Maximum	Mean	Std. Deviation
Power Limbs	Pretest	27	33.00	45.00	39.00	3.36
	Posttest	27	34.00	46.00	40.29	3.42

Based on the descriptive statistics, Table 1 shows that the leg power of taekwondo athletes at the pretest averaged 39.00 ± 3.36 at the posttest after being given 8 weeks of training with resistance bands increasing by an average of 40.29 ± 3.42 .

The data normality test used the Shapiro-Wilk method with a significance level of 0.05. Analysis using SPSS 23 software. The results of the normality test are presented in Table 3:

Table 3. Results of Normality Test Analysis

Power Limbs	Shapiro-Wilk		
	Statistic	df	Sig.
Pretest	0.949	27	0.204
Posttest	0.961	27	0.383

Based on the statistical analysis of the normality test that was carried out using the Shapiro-Wilk test, the data on the leg power of taekwondo athletes during the pretest and posttest obtained normality test results with a significance value of $p > 0.05$, which means that the data is normally distributed.

Homogeneity test using the Levene Test with a significance level of 0.05. Analysis using SPSS 23 software. The results of the homogeneity test are presented in Table 4:

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Table 4. Results of Homogeneity Test Analysis

Test of Homogeneity of Variances				
Power Limbs	Levene Statistic	df1	df2	Sig.
Pretest- Posttest	0.015	1	54	0.904

Based on the results of the analysis in Table 4, it can be seen that the pretest-posttest leg power of taekwondo athletes obtained sig. $p > 0.05$, so the data is homogeneous.

Hypothesis analysis using the t-test, the t-test used is the paired sample test. Analysis using SPSS 23 at a significance level < 0.05 . The results of hypothesis testing are presented in Table 5:

Table 5. Results of Paired Sample T Test Analysis

Paired Samples Test								
Pair	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest-Posttest Limb Power	1.29	0.82345	0.15847	-1.62204	-0.97055	8.180	26	0.000

Based on the results of the analysis in Table 5, the pretest-posttest for the intensive interval group obtained a t-count of 8,180 with a p-significance value of $0.000 < 0.05$, these results indicate that there is a significant difference. Thus the hypothesis "There is a significant effect of 8 weeks of training with resistance bands on the leg power of taekwondo athletes", is **accepted**. The magnitude of the increase in leg power of taekwondo athletes after being given 8 weeks of training with resistance bands was 3.31%.

DISCUSSION

The results showed that 8 weeks of training with resistance bands significantly increased the leg power of taekwondo athletes. The increase in leg power of taekwondo athletes after being given 8 weeks of training with resistance bands was 3.31%. The combination of resistance band exercises is effectively used to increase jump height and leg strength, as well as increase speed and agility (Loturco et al., 2022). The results of the study (Yoon et al., 2017) show that the use of elastic bands provides a significant increase in the level of cognitive function, physical function, and muscle strength. Research from (Yasuda et al., 2014) shows that exercise using elastic bands has increased muscle activation and is an effective method for building muscle hypertrophy in adults who have low activity.

The results of research (Spracklin et al., 2017) by placing a circular resistance band around the thighs can be used as a training strategy to increase hip muscle activation during free barbell back squats using moderate to heavy loads without negatively affecting performance. A meta-analysis study conducted by (Lopes et al., 2019) shows that resistance training using elastic bands has an effect on increasing muscle strength similar to conventional resistance training using weight machines and dumbbells in sedentary older adults. Resistance bands have advantages including being cheaper when compared to conventional resistance devices such as weight machines and dumbbells, easy to use and easy to carry. (Guillot et al., 2019) proved that elastic band training significantly improved sit-and-reach (29.16% increase, $p = 0.01$) as well as side split stretching performance (2.31% increase, $p < 0.001$).

This study (Foley et al., 2017) investigated the effect of a loop resistance band, placed around the distal thigh, on medial knee collapse and muscle activity during a barbell back squat. More specifically, the band is evaluated in terms of training status (trained or untrained) and load (3RM or BW). Interestingly, there was a significant effect of load intensity (3RM or BW) on lower extremity muscle activity. Resistance bands will improve neuromuscular function and can also cause post-activation potentiation, which is a temporary increase in muscle work which is the result of previous contractions (Low et al., 2019).

Resistance band training, also known as strength training or weight training, is often used as an effective method of developing muscle fitness (Özsu, 2018). (Chen et al., 2018) stated that resistance training is an exercise program that causes muscles to contract against external loads in the hope of increasing endurance, strength, muscle mass. In resistance band training, the athlete works to develop the eccentric phase of muscle contraction by first losing body or weight and then overcoming the body weight using concentric contractions. Research related to the effect of resistance bands was conducted (Andersen et al., 2018); (Dewanti et al., 2020) shows that resistance band training has an effect on power.

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The strength of the elastic band provides resistance for muscle movement. The degree of resistance depends on the stretch properties of the tape material. Currently, rubber bands are used for physical therapy and rehabilitation to improve individual functional capacity, for chronic illnesses and to develop the functional capacity of athletes. It is preferable to provide the opportunity to set individual power and traction ratios. Elastic bands can be used to strengthen certain muscle groups, and also affect flexibility and balance (Oh, 2021). The benefits of resistance bands have been proven to be real after being used by senior classes and their use also has a fairly high level of safety if done under the supervision of a trainer. Exercise using resistance bands has been shown to increase muscle activation and is an effective method for increasing muscle mass. The better the power an athlete has, the more likely the athlete will be able to perform technical movements in sports, because it is known that power will allow the muscles to do physical work explosively.

CONCLUSION

Based on the results of the study it can be concluded that 8 weeks of training with resistance bands is significant for increasing the leg power of taekwondo athletes. The increase in leg power of taekwondo athletes after being given 8 weeks of training with resistance bands was 3.31%. For further research, it is hoped that it will further expand the scope of research, by examining other factors that influence increasing leg muscle power, as well as expanding the research sample.

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