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The effect of 8 weeks of punch resistance band and dumbbell training on the arm power of 'youth' male boxers

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Abstract

This study aims to compare the effect of resistance band and dumbbell punch training on male boxers in the youth category (17 – 18 years). This type of research is an experiment with a two groups pretest-posttest design. The training was carried out 24 times with 3 meetings in 1 week. The research sample was 24 male boxers with the characteristics of age 17 ± 0.5 years, weight 51 ± 3.1 kg, height 165.5 ± 2.5 cm, experience 1.9 ± 0.6 years. The test instrument is a *two hand medicine ball chest pass*, with a ball weight of 3 kg. The level of validity of the test shows an Aiken V value of 0.925 and Cronbach Alpha reliability of 0.734. The results of this research using the t test show that punch resistance band training has a sig. 0.001 ($p < 0.005$) and dumbbell training sig. 0.000 ($p < 0.005$) means that Punch Resistance Band training and Dumbbell training have an effect on the arm power of male amateur boxers in the youth category. Independent sample t test, sig value. 0.471 ($p < 0.005$) means that there is no difference between the treatment of Punch Resistance Band and Dumbbell training on the arm power of male amateur boxers in the youth category. Then the effect value is shown by the Adjusted R Square with a value of 0.687 or 68.7% on the punch resistance band and dumbbells is 0.694 or 69.4%. This conclusion is that Punch Resistance Band and Dumbbell exercises can be chosen by coaches or boxers to increase arm power. Then this exercise can also be combined with other exercises such as shadow boxing, interval or circuit.

Keywords: Punch resistance band, dumbbell, arm power, boxing

Introduction

Amateur boxing is a combat sport that uses speed, quickness, power, agility, aerobic and anaerobic endurance to win a match^[40]. In amateur boxing matches, the duration of the match is 3 rounds \times 3 minutes for seniors and 3 rounds \times 2 minutes for juniors or youth with a rest period of 1 minute between rounds. Amateur boxing in Indonesia is a martial sport for pioneering achievements starting from the student (junior and youth) to senior (elite) categories in regional, national and international competitions such as the ASEAN Games, Asian Games and Olympics^[32].

Performance sports that involve physical contact between athletes definitely involve power performance. Power is one of the main physical components in all combat sports^[35, 6]. In a boxing match, power is generated from how fast the punch moves with the strength of the boxer's hand swing^[15, 10]. A blow that has more power than the opponent can cause the opponent to fall, be knocked out, or cause injury. So boxers who have strong power will generate profits to win competitions, especially amateur boxing which only has 3 rounds and no draw calculations^[14]. However, to get an absolute victory, namely a *knockout*, is not easy. Then boxing match categories such as Junior and Youth still use head guards which will obviously reduce the effect of power punches^[9]. So it will be difficult to get an absolute victory by *knockout*. Therefore, to produce a power punch, appropriate, measurable and systematic training is needed^[12]. The amount of punching power also depends on body weight classification, the heavier the boxer's body, the greater the power produced, although this will result in a lack of punching speed^[8]. Then skills such as training experience and how often he participates in competitions also influence a boxer's skills^[10]. The last is the type of punch from boxing^[22].

Exercises to produce power in punches by increasing the load gradually and doing it quickly. Some practical training methods to improve your stroke are by using a resistance band or using dumbbells [4]. There has been a lot of research in several combat sports that apply training using resistance bands to be useful for increasing power, such as muay thai and taekwondo [31, 26, 38]. Then research has found that there is an effect of training using dumbbells on the power of boxing punches [7, 21, 34]. The facts in the field are that training like this has been implemented by many coaches to increase power. However, from the training program created to the power test carried out, it is not reported in scientific publications, especially in boxing. Then, from the results of interviews with boxing coaches in the city of Jakarta, Indonesia, it was explained that the arm strength of youth category boxers was still lacking, it was proven that there were no punches that resulted in a knockout. Apart from the match results, the results of the arm strength test using the Medicine Ball Chest Pass also showed poor results so it was still far from the coach's expectations [18].

The aim of this study was to test and compare the effects of punch resistance band and dumbbell training on youth category boxers (aged 17 – 18 years). Currently, the training method for increasing the arm strength of youth category male boxers still uses variations of the push up exercise. So the importance of this research is to prepare boxers to further improve their achievements and careers. Apart from that, after passing this age, boxers will compete at senior level, who will of course be superior physically, technically, tactically and mentally. Then, it was studied in terms of the physiological abilities of athletes aged 17 – 18 who were mature enough to be trained in power, especially combat sports [13, 36, 42, 28]. However, you still need to pay attention to the recovery time and condition of the boxer during training to avoid injury.

Materials and Methods

Study Participants

The sample for this research was 24 male boxers in the Youth

category aged 17 - 18 years in accordance with AIBA rules. The boxer's profile is age 17 ± 0.5 years, weight 51 ± 3.1 kg, height 165.5 ± 2.5 cm, training experience 1.9 ± 0.6 years. The qualifications of the youth boxers involved in this research, firstly, are boxers who have competed at least regional level, secondly, they are not injured or sick, and thirdly, they are not currently undergoing a competition training program.

The samples carry out a pre-test first, after the pre-test results are known then the samples are paired using the A-B-B-A pattern. The sample distribution technique in this research uses ordinal pairing. After determining patterns in a sample of youth boxers, it was found that 12 boxers did punch resistance band training and 12 boxers did them with dumbbell training.

Study Participants

This type of research is experimental research. Experimental research aims to investigate the influence and study changes that occur in other variables. This research design is a 'two groups pretest-posttest design'. The test instrument in this study was a *two hand medicine ball chest pass*, the medicine ball weighing 3 kg was used [40, 16]. The reason the researchers used the medicine ball test was because the power test was in accordance with boxing, which is a type of sport using the hands (punches) and the direction of the test movement was in accordance with boxing punches. *Two hand medicine ball chest pass* is measured using centimeters (cm), the validity of the test shows an Aiken V value of 0.925 and Cronbach Alpha reliability of 0.734.

The training was carried out for 8 weeks with 24 meetings. Boxers perform resistance band and dumbbell punch movements, each of the 3 basic boxing punch techniques, jab/straight, hook, uppercut with a fast movement rhythm. The weight of the dumbbells used is 1 kg and the material used is not hard. This is because after the boxer is hit, the hand must return to line with the temple or eyebrow. If the dumbbell accidentally hits it, the boxer's temple or eyebrow will not be injured. The following is a punch resistance band and dumbbell training program.

Table 1: Punch Resistance Band and Dumbbell Training Program

Practice	Intensity	Set	Repetition	Recovery	Interval
1 - 6	40%	5	24x	30 seconds	1.5 minute
			(8x jab/straight, 8x hook, 8x uppercut)		
7 - 1.2	50%	5	30x	30 seconds	1.5 minute
			(10x jab/straight, 10x hook, 10x uppercut)		
13 - 18	60%	5	36x	30 seconds	1.5 minute
			(12x jab/straight, 12x hook, 12x uppercut)		
19 - 24	70%	5	42x	30 seconds	1.5 minute
			(14x jab/straight, 14x hook, 14x uppercut)		

Statistical Analysis

Statistical analysis of this research uses the t test. Researchers used two types of t tests, namely paired sample tests and independent sample tests with a significance value ($p < 0.005$). However, before carrying out the t test, the normality test (Shapiro Wilk) and homogeneity test (leaven) are first carried out. The data analysis process uses SPSS version 26.

Results

Normality Test

After carrying out the pre-test and post-test, next is the analysis of the research results. The first step is to test normality using Shapiro Wilk.

Table 2: Normality Test Result

Group		Shapiro-Wilk		
		Statistic	df	Sig.
Punch Resistance Band	Pre Test	0.895	12	0.138
	Post Test	0.895	12	0.138
Dumbbell	Pre Test	0.904	12	0.180
	Post Test	0.881	12	0.091

Based on table 2, the results of the Punch Resistance Band group are the pre-test sig value. 0.138 and post-test value sig. 0.138 or $p > 0.05$ means that the group of boxers who train with the Punch Resistance Band has a normal distribution. Then the Dumbbell group, namely the pre test value sig. 0.180 and post test value sig. 0.091 or $p > 0.05$ means that the group

of boxers who train with dumbbells is also normally distributed. After carrying out the normality test, the second step is a homogeneity test.

Homogeneity Test

Table 3: Homogeneity Test Result

Group	Leavene Statistic	df1	df2	Sig.
Pre Test and Post Test Punch Resistance Band	0.001	1	22	0.681
Pre Test and Post Test Dumbell	0.018	1	22	0.596

From the results in table 3, the pre-test and post-test significance values for the group of boxers who train with the Punch Resistance Band are sig. 0.681 or $p > 0.05$ and the significance value of the pre-test and post-test in the group of boxers who trained with dumbbell was sig. 0.596 or $p > 0.05$,

meaning that the boxers have the same characteristics and are suitable for further testing.

Hypothesis Test

Table 4: Test Result

Variabel	Group	Mean	T	Sig.
Power Lengan	Pre Test and Post Test Punch Resistance Band	59.417	46.350	0.001
	Pre Test and Post Test Dumbell	71.083	81.297	0.000

Based on the hypothesis test in table 4, it can be seen that the pre-test and post-test of boxers who train with the Punch Resistance Band have a significance value of 0.001 or $p < 0.005$. Then the pre-test and post-test results of boxers who train with dumbbells have a significance value of 0.000 or $p < 0.005$. From these results, it means that training using Punch Resistance Bands and Dumbbells has an effect on the

arm strength of boxers in the male youth category.

Independent Sample T Test

After carrying out the t test, the researcher also carried out an independent sample t test to measure whether there were different values from different treatments but from the same population.

Table 5: Independent Sample T Test Result

Variabel	Group	T	df	Sig.
Power Lengan	Punch Resistance Band - Dumbell	0.734	22	0.471

Based on the results from table 5, the significance value is 0.471 or $p < 0.471$, meaning there is no difference between the Punch Resistance Band and Dumbell training treatments on

the arm power abilities of male youth category boxers.

Coefficient of Determination (Adjusted R Square)

Table 6: Adjusted R Result

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Punch Resistance Band	,694 ^a	0,688	0,687	6,522
Dumbell	,697 ^a	0,694	0,694	5,170

Based on table 6, how much is the value of the effect of training on the arm power of youth category boxers by looking at the Adjusted R Square. The effect of punch resistance band on arm power is 0.687 or 68.7%, while the effect of dumbbell training on arm power is 0.694 or 69.4%.

Discussion

Power is an important physical component for boxing. Power is produced when a boxer swings his arm as his strength to punch with a short time as his movement speed. Type of exercise to stimulate increased power, namely by using weights accompanied by fast movements. The aim is to stimulate muscles such as shoulder muscles, arm muscles, elbow joints so they can make fast and strong punches [41]. Previous research explains that the form of training must also be adapted to the punching movements in boxing, namely straight punches, hooks or uppercuts [15]. An example of this is push up training, push training can provide strong pressure for a boxer when throwing punches [1]. However, push up

training does not have a significant increase in boxer arm strength [29]. So it is necessary to train with more specific weights according to boxing movements, namely by using dumbbells and resistance bands.

Training using dumbbells and resistance bands has been proven to be effective in improving the punches of athletes in martial arts other than boxing, such as karate, mma and muaythai [11, 31, 20, 23, 33]. This is because training with dumbbells or resistance bands is more flexible than push ups. If push ups are only done in one place or cannot be moved, dumbbells or resistance can be done by changing places such as forward, backward or sideways. So that it suits the conditions when the boxer is fighting. Then the size of the training load using dumbbells or resistance bands can be measured according to the boxer's physical fitness and abilities. Because boxing uses body weight classes, the needs and abilities of boxers between the fly weight and welter weight classes are also different [32].

Based on the results of this research, it was explained that

training for 8 weeks using dumbbells and resistance bands could increase the arm power of male youth boxing athletes. Then the value of the influence of punch resistance band training is 68.7% while the effect of dumbbell training is 69.4%. This exercise shows that there is a training method other than push ups that can increase the arm power of boxing athletes more effectively and efficiently and this exercise can be adjusted when boxers compete. Boxers can also use training with dumbbells and resistance bands to do shadow boxing by Power is an important physical component for boxing. Power is produced when a boxer swings his arm as his strength to punch with a short time as his movement speed. Type of exercise to punching, moving places by imagining the enemy in front of them^[3]. As previous research has proven, shadow boxing plays a greater role in increasing cardiovascular endurance or vo_{2max} ^[5, 19, 27, 30]. However, if you combine 2 types of training, namely dumbbell or resistance band training with shadow boxing, it will definitely have an impact on the boxer's abilities. Of course, this increase in ability is expected of all athletes^[37, 17, 24]. Then practicing punches using weights also affects the speed of boxing punches. The heavier the weight used for training, the speed of the blow will also increase. The gloves that boxers use when competing are also not as heavy as dumbbells or resistance bands. So it is possible that the boxer's punch speed when competing will also be faster. However, still have to measure according to the boxer's weight class capabilities.

Therefore, the results of this research can provide recommendations for training for 8 weeks that are suitable for male boxers in the youth category. So far, many trainers understand that to increase arm muscle strength you must use heavy weights like those in the gym. However, it definitely takes more effort to train in the gym. So training with dumbbells and resistance can provide a solution for coaches or boxers. Then it is hoped that in the future, this research can be a basis for developing types or variations of training to increase boxers' arm and punch power or add other variables, increase the sample so that training does not focus on increasing power alone but improving the physical condition of boxers.

Conclusion

The results of dumbbell and punch resistance band training for 8 weeks had an effect on increasing the arm power of male youth boxers, with the effect value of Punch Resistance Band training 68.7% and dumbbell training 69.4%. So far, many coaches and boxers have used many training methods to increase arm power. However, the lack of scientific research results has resulted in a lack of references for use in training. So this exercise can be recommended for trainers or boxers who want to increase arm power effectively and efficiently. Then this exercise can also be combined with other exercises such as shadow boxing to get better abilities. In the future, research can become a reference for combat sports or boxing by developing training volume and intensity, comparing other martial arts power abilities and comparing samples such as weight categories, amateur level categories (junior, youth, elite), gender or level in amateur and professional.

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