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Comparison in the Effect of Resistance Punch and Dumbbell Punch Training Toward the Enhancement of Arm Muscle Power of Kyorugi Athletes of Ocean Taekwondo Club, Magelang Regency

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ABSTRACT

This study aims to investigate the effect of resistance punch training on arm muscle power, examine the effect of dumbbell punch training on arm muscle power, and determine whether there is a significant difference between the two training methods in developing arm power among kyorugi athletes of Ocean Taekwondo Club, Magelang Regency. This research employed a quantitative experimental approach using a two-group pretest–posttest design. A total of 20 athletes were selected through purposive sampling based on inclusion criteria such as training experience, belt rank, and age suitability. The participants were divided into two equal groups: a resistance punch training group and a dumbbell punch training group. Both groups underwent 16 training sessions, and arm muscle power was assessed using the medicine ball chest pass test.

The results of the paired sample t-test revealed that resistance punch training had a significant effect on enhancing arm muscle power, indicated by a significance value of 0.03 (<0.05) with an improvement of 0.47%. Dumbbell punch training also produced a significant effect, with a significance value of 0.01 (<0.05) and an improvement of 0.58%. However, the independent sample t-test indicated no significant difference between the two training methods, with a significance value of 0.732 (>0.05). These results demonstrate that both training variations are effective in increasing arm muscle power, but neither method is superior.

Overall, the study suggests that coaches may implement either resistance punch or dumbbell punch training as both are capable of improving arm muscle explosiveness essential for kyorugi performance. The findings may serve as a reference for designing upper-body power development programs tailored to combat sport athletes.

Keywords: *Dumbbell Punch, Kyorugi, Power* Otot Lengan, *Resistance Punch*, Taekwondo

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Introduction.

Sport has become an essential element in human life, functioning not only as a form of physical activity but also as an activity that contributes to the physical, psychological, and social well-being of individuals [Biddle et al, 2021) Modern society views sport as a fundamental need that supports balanced living, health maintenance, and the development of discipline and character. In the realm of sports performance, athletes

must undergo structured, continuous, and scientifically designed training programs in order to maximize their physical potential and optimize their performance in competitive settings (Bompa & Buzzichelli, 2018).

Taekwondo is one of the most widely practiced martial arts in the world, originating from Korea and evolving into a sport that emphasizes a combination of speed, power, accuracy, and strategic movement. In Indonesia, taekwondo has grown rapidly at both grassroots and elite levels, supported by extensive national and regional competitions such as POPDA, PORPROV, PON, SEA Games, Asian Games, and ultimately the Olympic Games. The discipline instills important character values such as respect, self-control, perseverance, and responsibility while simultaneously demanding high levels of technical precision and physical conditioning (Pieter & Heijmans, 2018).

Within taekwondo, the kyorugi category represents the sparring or combat component where athletes engage in direct competition against an opponent on a formal platform following established rules. To perform effectively in kyorugi, athletes must possess excellent physical attributes, particularly speed, agility, reaction time, muscular strength, flexibility, and explosive power (Bridge et al, 2014). While kicking is often emphasized in taekwondo, punching techniques (especially straight punches to the permitted scoring area) are equally vital in regulating match tempo, managing distance, accumulating points, and executing counterattacks or defensive maneuvers. Effective punching requires the integration of upper-body strength, speed, coordination, and rapid force production components directly influenced by arm muscle power.

Arm muscle power refers to the ability of the upper-limb muscles to generate maximum force in a short period of time. This component is essential not only for producing strong and fast punches but also for stabilizing the torso, maintaining balance during attacks, and establishing a stable kinetic chain during explosive movements (Zatsiorsky & Kraemer, 2006). In taekwondo competitions, athletes who possess greater arm muscle power are generally more capable of delivering effective punches that can disrupt opponents' rhythm, create openings, and convert tactical opportunities into scores.

To enhance arm muscle power, various training methods can be applied, including resistance punch training and dumbbell punch training. Resistance punch utilizes elastic resistance tools that create external tension, allowing the athlete to experience increased load throughout the movement range. This method enhances neuromuscular coordination, muscle activation, and elastic energy utilization. Meanwhile, dumbbell punch training uses handheld weights to increase the mechanical load on the muscles involved in punching. It contributes to muscle hypertrophy, motor unit recruitment, and improved rate of force development.

Previous studies in strength and conditioning highlight the effectiveness of resistance-based and load-based training in improving upper-body power (Andersen et al, 2010). However, direct comparative analysis between resistance punch and dumbbell punch training in taekwondo athletes is still limited. This study attempts to fill this gap by examining not only the effectiveness of each method but also evaluating which, if any, produces superior outcomes in arm muscle power development.

Given the importance of arm power in taekwondo performance and the limited empirical research comparing these two training modalities, this study becomes relevant. The results are expected to provide scientific insights for coaches, athletes, and practitioners in selecting effective training methods for enhancing upper-body explosiveness, particularly in kyorugi athletes who operate in high-speed, high-intensity combat environments.

Methodology

This study employed an experimental research design aimed at examining the causal relationship between the independent variables—namely the resistance punch and dumbbell punch training methods—and the

dependent variable, which is the improvement of arm muscle power. The research utilized a two-group pretest–posttest design, allowing the researcher to observe changes in performance before and after the treatment in each group. Both groups completed a pre-test prior to the intervention, received different training treatments, and subsequently completed a post-test using the same measurement instrument. This design enabled the identification of performance changes resulting from the administered training.

The population of the study consisted of 40 active kyorugi athletes from the Ocean Taekwondo Club in Magelang Regency. The sample was selected using a purposive sampling technique based on predetermined criteria, including: having participated in taekwondo training for at least one year, being an active member of the club, holding a minimum belt rank of blue (Geup 5), being between 16–18 years old, being able to perform punching techniques with both hands properly, and being willing to undergo 16 training sessions. Based on these criteria, a sample of 20 athletes was selected and randomly assigned into two groups, each consisting of 10 athletes.

The first group received the resistance punch training, while the second group received the dumbbell punch training. Both groups underwent a total of 16 training sessions over approximately four weeks, with equal training frequency. Each training program was specifically designed to target the development of arm muscle power through explosive punching movements aligned with the characteristics of each method.

Arm muscle power was measured using the medicine ball chest pass test, administered during both the pre-test and post-test sessions. Athletes performed two attempts, and the best score was recorded as the data point for analysis.

Data analysis consisted of several stages. First, the Shapiro–Wilk test was used to assess data normality. Second, a homogeneity test was conducted to determine whether the data across groups had equal variances. Third, the paired sample t-test was used to evaluate the effect of each training method within its respective group. Finally, the independent sample t-test was employed to determine whether there were significant differences in effectiveness between the two training methods. All statistical analyses were performed using SPSS version 30.0 with a significance level of $\alpha = 0.05$.

Results

This study examined the effects of resistance punch training and dumbbell punch training on the arm muscle power of kyorugi athletes. Data analysis was conducted through several stages, including normality testing, homogeneity testing, paired sample t-tests, and an independent sample t-test. All analyses were performed using a significance level of 0.05.

Normality Test Results

The Shapiro–Wilk test was conducted to examine the distribution of the research data. The results are presented in Table 1.

Table 1. Normality Test Results

Group	Sig.	Description
Resistance Punch Pre-Test	0.935	Normal
Resistance Punch Post-Test	0.939	Normal
Dumbbell Punch Pre-Test	0.950	Normal
Dumbbell Punch Post-Test	0.951	Normal

The Shapiro–Wilk test was employed to determine whether the data were normally distributed. As shown in Table 1, all pre-test and post-test data for both the resistance punch and dumbbell punch groups obtained significance values above 0.05. These results indicate that the datasets met the assumption

of normality and were therefore appropriate for parametric statistical analysis.

Homogeneity Test Results

The homogeneity test was conducted to determine whether the variance of data across groups was equal. The results are shown below:

Table 2. Homogeneity Test

Data	Sig.	Description
Arm Muscle Power	0.941	Homogeneous

A homogeneity test was conducted to verify whether the variances across groups were equal. The test resulted in a significance value of 0.941 (Table 2), which exceeds the threshold of 0.05. This finding demonstrates that the data had homogeneous variance, fulfilling another prerequisite for the use of t-tests.

Hypothesis Testing

Hypothesis 1: Effect of Resistance Punch Training

Table 3. Paired Sample t-test for Resistance Punch Group

Variable	t-value	Sig.	Description
Pre-test vs Post-test	1.833	0.03	Significant

The paired sample t-test for the resistance punch group revealed a t-value of 1.833 with a significance level of 0.03 (Table 3). Since the significance value is below 0.05, it can be concluded that resistance punch training produced a statistically significant improvement in arm muscle power. The magnitude of improvement in this group was recorded as 0.47%.

Hypothesis 2: Effect of Dumbbell Punch Training

Table 4. Paired Sample t-test for Dumbbell Punch Group

Variable	t-value	Sig.	Description
Pre-test vs Post-test	1.833	0.01	Significant

Similarly, the paired sample t-test for the dumbbell punch group showed a t-value of 1.833 with a significance level of 0.01 (Table 4). This indicates that dumbbell punch training also resulted in a statistically significant increase in arm muscle power. The improvement observed in this group was slightly higher than that of the resistance punch group, amounting to 0.58%.

Hypothesis 3: Comparison Between Both Training Methods

Table 5. Independent Sample t-test Results

Group Comparison	t-value	Sig.	Description
Resistance Punch vs Dumbbell Punch	-0.349	0.732	Not Significant

To determine whether there was a significant difference in effectiveness between the two training methods, an independent sample t-test was conducted. The analysis produced a t-value of −0.349 with a significance level of 0.732 (Table 5). Since this value exceeds the threshold of 0.05, it can be concluded that there is no statistically significant difference between resistance punch and dumbbell punch training in enhancing arm muscle power.

Dicussion

The success of athletes in taekwondo is influenced by various factors, one of which is optimal physical condition. Physical

components such as strength, speed, endurance, agility, and especially power or explosive strength play an essential role in supporting athlete performance during competition. Although taekwondo is widely associated with kicking techniques, arm strength remains a significant contributor to the effectiveness of many technical movements performed in matches.

Arm muscle power enables athletes to effectively withstand an opponent's attacks, initiate offensive movements, facilitate smooth execution of counterattacks, and maintain control over the rhythm of the match. Additionally, arm power functions as an important component in maintaining body balance, particularly when executing attacks that require coordination of the entire body.

The results of hypothesis testing support the importance of arm power. The analysis for Hypothesis 1 showed that resistance punch training produced a significant effect on the arm muscle power of kyorugi athletes at Ocean Taekwondo Club, Magelang Regency ($t = 1.833$; Sig. = $0.03 < 0.05$), resulting in a 0.47% improvement. Similarly, the analysis for Hypothesis 2 demonstrated that dumbbell punch training had a significant effect on arm muscle power ($t = 1.833$; Sig. = $0.01 < 0.05$), with a 0.58% improvement. Based on the analysis of Hypothesis 3, the comparison between resistance punch and dumbbell punch training indicated that there was no significant difference in their effects ($t = -0.349$; Sig. = $0.732 > 0.05$). This confirms that although both methods improve arm muscle power, neither method is statistically superior.

Both resistance punch and dumbbell punch training aim to enhance arm muscle power by strengthening muscles, increasing movement speed, and improving functional coordination during punching motions. Punching movements performed while holding a resistance band or dumbbells require greater engagement from key upper-body muscles such as the biceps, triceps, and shoulders. This increased muscular workload stimulates adaptation and strengthens the muscles involved. In addition, both training methods engage core muscles as stabilizers, which is essential for generating powerful and well-directed punches.

With progressively increased repetitions, these exercises help accelerate muscle contraction and develop dynamic strength. This is particularly important in taekwondo, where short-distance explosive strikes must be executed effectively. The primary objective of these training methods is to enable athletes to generate stronger, faster, and more stable punches during competitions and technical training sessions. In combat sports, resistance punch and dumbbell punch exercises are widely used to improve arm explosive power, contributing to more powerful and impactful punches (Loturco et al, 2018).

The results obtained in this study reinforce the findings from previous research. Dedy (2017) reported that plyometric-based training programs significantly influence performance, especially when aligned with an athlete's physical condition (Markovic et al, 2010). Similarly, dumbbell punch training represents one form of plyometric exercise designed to enhance explosive arm power (Lenetsky et al, 2018). Through this type of training, athletes can experience improvements in explosive strength because repeated movements stimulate increased motor unit activation. Greater motor unit involvement leads to the recruitment of more muscle fibers. This activation process subsequently promotes muscle fiber development, and as the number and size of muscle fibers increase, the muscles experience hypertrophy (Enoka & Duchateau, 2017).

Both resistance punch and dumbbell punch training have been shown to produce positive outcomes in increasing arm muscle power among taekwondo athletes. The findings of this study confirm that these training methods contribute significantly to improving the physical component of arm power, as evidenced by significance values below 0.05. Furthermore, both training methods help enhance key biomechanical aspects of movement, including accuracy, strength, and body balance during blocking

and punching motions, as well as other explosive actions. This is because both resistance punch and dumbbell punch training emphasize core muscle activation, which is essential in producing forceful and well-coordinated punching movements.

Conclusions

This study concludes that both resistance punch and dumbbell punch training significantly improve arm muscle power in kyorugi athletes of Ocean Taekwondo Club, Magelang Regency. Each method produced notable increases from pre-test to post-test, demonstrating their effectiveness in developing upper-body explosive strength. The comparison between the two methods showed no significant difference, indicating that both provide similar training benefits. Therefore, either resistance punch or dumbbell punch training can be used as an effective option to enhance arm muscle power in taekwondo athletes.

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