



The Effect of Plyometric Training on the T-Kick Performance of Pencak Silat Athletes at Tapak Suci Bukit Kecil

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Abstract

Objectives: This study aimed to determine the effect of plyometric training on the T-kick performance of pencak silat athletes at Tapak Suci Bukit Kecil.

Materials and Methods: This study employed a quasi-experimental design using a one-group pretest–posttest approach. The population consisted of 120 pencak silat athletes, from which 15 athletes were selected through purposive sampling. The treatment consisted of plyometric exercises, namely Single Leg Lateral Hop and Straddle Hops, conducted over 16 training sessions with a frequency of three sessions per week. The instrument used was a 20-second T-kick speed test. Data were analyzed using a paired-samples t-test with IBM SPSS Statistics version 26. Prior to implementation, the training program was validated by experts and achieved a feasibility score of 94.64%, indicating that it was highly feasible.

Results: The results of the paired-samples t-test revealed a significance value of 0.000 ($p < 0.05$), indicating a statistically significant improvement in the T-kick performance of the athletes following the plyometric training program.

Conclusions: Plyometric training significantly improves the T-kick performance of pencak silat athletes at Tapak Suci Bukit Kecil. Therefore, plyometric exercises can be recommended as an effective training method for enhancing kicking speed and overall performance in pencak silat athletes.

Keywords: plyometric training; T-kick performance; pencak silat; kicking speed; athletes.



Introduction

Pencak silat, as a competitive sport, requires systematic and well-planned training programs to ensure that all components supporting athletic performance can develop optimally (Saharullah, 2022). Competitive sports development demands structured and continuous training planning through the application of periodization principles so that athletes' physiological adaptations develop in accordance with the demands of the sport (Harsono, 2018). Athletic performance in competition is fundamentally determined by four main components: physical condition, technique, tactics, and mental preparedness, all of which must be developed in a balanced manner throughout the training process (Fajar, 2019).

Success in competition is largely determined by biomotor abilities, particularly strength, speed, endurance, agility, and coordination, which serve as the primary supporting factors for the effective execution of both offensive and defensive techniques (Bompa, Tudor O.; Buzzichelli, 2019; Zona, R. D. A.; Ridwan, M.; Suwirman; Yenes, 2020). In the context of this study, the physical component that serves as the primary focus is speed, as it is directly related to an athlete's ability to perform movements quickly and efficiently. Speed is defined as the ability to execute movements in the shortest possible time, making it a crucial factor in the successful implementation of techniques in martial arts, including pencak silat (Sajoto, 2016).

One of the most dominant attacking techniques and one that yields high scoring opportunities in pencak silat competitions is kicking. Kicks have a greater range than punches, making them a primary strategy for scoring points. The effectiveness of kicking techniques is highly influenced by lower-limb movement speed, as faster kicks are more difficult for opponents to anticipate. Therefore, speed is an essential component in supporting the successful execution of kicking techniques, particularly the T-kick.

The T-kick is one of the fundamental techniques in pencak silat, characterized by its wide range and effectiveness in competition. The ability to perform the T-kick effectively depends greatly on the speed of the lower-limb muscles in moving the leg toward the target. Good speed enables athletes to execute kicks rapidly and accurately, thereby increasing their chances of scoring points during competition. Conversely, suboptimal speed causes kicks to be more easily anticipated by opponents and reduces the effectiveness of attacks.

Efforts to improve lower-limb muscle speed require the implementation of appropriate, systematic, and sport-specific training methods. One effective training method for



improving speed is plyometric training, which utilizes the stretch–shortening cycle through rapid and explosive movements, thereby enhancing neuromuscular efficiency in producing rapid muscle contractions (Bompa, Tudor O.; Buzzichelli, 2019; Chu, Donald A.; Myer, 2013). Previous studies have demonstrated that plyometric training has a significant effect on improving kicking speed in pencak silat athletes (Yusradinafi, Y.; Prasetyo, F. A.; Diana, 2024).

Plyometric training consists of various exercises designed to improve lower-limb movement speed through rapid and coordinated muscle contractions. This training method applies the stretch–shortening cycle principle, which enhances neuromuscular efficiency in generating fast movements. In the context of pencak silat, improving lower-limb muscle speed is essential because it is directly related to an athlete's ability to execute kicking techniques effectively. Therefore, this study employs plyometric exercises specifically adapted to the movement characteristics of the T-kick, with the expectation of optimally improving the kicking speed of pencak silat athletes.

Based on preliminary observations conducted among athletes of Tapak Suci Bukit Kecil Pencak Silat School, several issues related to T-kick performance were identified. Some athletes demonstrated relatively slow kick execution and were less effective in performing rapid movements toward the target, which affected both attack effectiveness and scoring opportunities during competition. Observations accompanied by interviews with the coach revealed that most athletes still experienced delays in executing the T-kick, making it easier for opponents to anticipate. The coach also reported that the average time required for athletes to perform a T-kick was approximately ± 1.8 seconds. Furthermore, the existing training program had not specifically emphasized the development of lower-limb muscle speed through structured and measurable plyometric training methods (Manullang, J. G.; Setiawan, 2024).

Considering the importance of speed in the execution of the T-kick, supported by previous findings regarding the effectiveness of plyometric training, a scientific study is needed to specifically examine the effect of plyometric training on the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil. This study is important because it provides empirical evidence that can assist coaches in designing training programs that are more effective, efficient, and aligned with athletes' needs.

Based on the foregoing discussion, a research gap can be identified. Although several previous studies have demonstrated that plyometric training contributes to improvements in kicking speed among pencak silat athletes, most of these studies were



conducted within university student activity units or specific sports clubs and did not specifically examine the T-kick as a specialized technique in pencak silat. Furthermore, research conducted within regional Tapak Suci institutions, particularly at Tapak Suci Bukit Kecil, remains very limited.

Based on this research gap, the novelty of this study lies in: (1) its specific focus on examining the effect of plyometric training on T-kick speed; (2) the selection of athletes from Tapak Suci Bukit Kecil as research participants; and (3) the application of plyometric exercises in the form of Single Leg Lateral Hop and Straddle Hops, which are adapted to the characteristics of the athletes.

Therefore, through this study entitled “The Effect of Plyometric Training on the T-Kick Ability of Pencak Silat Athletes at Tapak Suci Bukit Kecil,” it is expected that empirical findings will be obtained to strengthen scientific evidence regarding the effectiveness of plyometric training in improving T-kick speed. The results of this study are expected to serve as a practical reference for coaches in developing scientifically based training programs and to enrich the body of knowledge in the field of pencak silat coaching.

Materials and Methods

Study Design

This study employed a quasi-experimental method using a one-group pretest–posttest design (Sugiyono, 2019). This design was used to determine changes in T-kick ability before and after the implementation of a plyometric training program. The study followed a Pre-Experimental Design, in which participants completed a pretest, received the plyometric training intervention, and subsequently completed a posttest to evaluate the effect of the treatment on the T-kick ability of pencak silat athletes.

Study Participants

The population consisted of 120 athletes from Tapak Suci Bukit Kecil. A total of 15 athletes were selected as the research sample using a purposive sampling technique (Arikunto, 2020). The inclusion criteria were: (1) active athletes, (2) having at least one year of training experience, (3) mastering the basic T-kick technique, (4) being free from injury during the study period, and (5) participating in all stages of the research.

Study Organization

The training program was conducted for six weeks with a frequency of three sessions per week. The plyometric training consisted of Single Leg Lateral Hop and Straddle Hops



exercises, which were selected based on their relevance to the movement characteristics of the T-kick. Data collection was carried out through a pretest and posttest procedure. The research instrument used was the 20-second T-kick speed test, which was designed to measure the athletes' T-kick performance (Nurhasan, 2017; Widiastuti, 2015).

Statistical Analysis

The data were analyzed quantitatively using both descriptive and inferential statistics. Descriptive statistics were used to summarize the mean, maximum, and minimum scores of the pretest and posttest T-kick performance. Prior to hypothesis testing, data normality was assessed using the Shapiro–Wilk test to determine whether the data were normally distributed. Subsequently, the hypothesis was tested using a paired-sample t-test at a significance level of 0.05 to examine the effect of plyometric training on the T-kick ability of pencak silat athletes. All statistical analyses were performed using IBM SPSS Statistics version 26.

Results

This study aimed to determine the effect of plyometric training on the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil. The research data were obtained through a T-kick performance test administered before the intervention (pretest) and after the intervention (posttest).

The results of the descriptive statistical analysis of the athletes' T-kick ability before and after plyometric training indicated improvements in the mean score, highest score, and lowest score. The descriptive statistics of the pretest and posttest results are presented in Table 1.

Table 1. Descriptive Statistics of Pretest and Posttest Results

Variabel	Pretest	Posttest
Rata-rata	25,47	30,47
Nilai Tertinggi	30	34
Nilai Terendah	20	25

Based on Table 1, the mean T-kick performance score increased from 25.47 in the pretest to 30.47 in the posttest. In addition, the highest score increased from 30 to 34, while the lowest score increased from 20 to 25. These findings indicate that plyometric training improved the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil.

As a prerequisite for applying parametric statistical tests, the research data were first subjected to a normality test using the Shapiro–Wilk test. The normality test was conducted to determine whether the pretest and posttest T-kick performance data were normally distributed. The results of the normality test are presented in Table 2.

**Table 2.** Results of the Shapiro–Wilk Normality Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest Kecepatan Tendangan T	.167	15	.200*	.963	15	.748
Posttest Kecepatan Tendangan T	.161	15	.200*	.913	15	.148
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Based on Table 2, the significance values of both the pretest and posttest data were greater than 0.05. Therefore, the data were normally distributed and met the assumptions required for parametric analysis using a paired-sample t-test.

After confirming the normality of the data, hypothesis testing was conducted using a paired-sample t-test. This test aimed to determine whether there was a significant difference between the pretest and posttest T-kick performance of the athletes following the plyometric training program. The results of the paired-sample t-test are presented in Table 3.

Table 3. Results of the Paired-Sample t-Test

		Paired Samples Test							
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest Kecepatan Tendangan T - Posttest Kecepatan Tendangan T	-5.00000	.75593	.19518	-5.41862	-4.58138	-25.617	14	.000

Based on the paired-sample t-test results presented in Table 3, the significance value (Sig. 2-tailed) was 0.000, which was lower than 0.05. This result indicates a significant difference between the pretest and posttest T-kick performance scores of the athletes. Furthermore, the mean T-kick performance increased from 25.47 in the pretest to 30.47 in the posttest after completing the plyometric training program. Therefore, it can be concluded that plyometric training had a significant effect on improving the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil.

Discussion

Based on the results of this study, it was found that plyometric training had an effect on the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil. This can be observed from the improvement in the posttest results compared to the pretest results after the

athletes participated in the plyometric training program. The mean pretest score of 25.47 increased to 30.47 in the posttest. In addition, the highest score increased from 30 to 34, while the lowest score increased from 20 to 25. These findings indicate an improvement in the athletes' T-kick ability after completing the plyometric training program.

Based on the data analysis using a paired-sample t-test, the significance value (Sig. 2-tailed) was 0.000. Since this significance value was lower than 0.05, H_0 was rejected and H_a was accepted. Therefore, it can be concluded that plyometric training had a significant effect on the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil.

The improvement in T-kick ability observed in this study occurred because plyometric training was able to enhance the athletes' physical capacities, particularly movement speed, coordination, balance, agility, and the neuromuscular function of the lower-limb muscles.

In pencak silat, the T-kick is a technique that requires fast, explosive, and accurate movements, making good physical conditioning essential. These abilities enable athletes to execute kicks more quickly and effectively during competition.

The plyometric training program implemented in this study consisted of Single Leg Lateral Hop and Straddle Hops exercises, as illustrated in Figure 1. These exercises were designed to improve lower-limb explosive power, balance, agility, and neuromuscular coordination, which are essential components for executing an effective T-kick in pencak silat.

Figure 1. Single Leg Lateral Hop and Straddle Hops



The findings of this study are consistent with previous research indicating that plyometric training can improve kicking performance in pencak silat athletes. Yusradinafi et al. (2024) reported that plyometric exercises significantly increased the speed of the



crescent kick among pencak silat athletes. Similar findings were also reported by Lengo et al. (2023), who found improvements in lower-limb explosive power following a plyometric training program. In addition, Satria et al. (2021) demonstrated that plyometric training contributed to better kicking performance through enhanced muscle power and movement efficiency. Kamarudin et al. (2023) further supported these results, showing that plyometric-based exercises positively affected kicking speed and lower-extremity performance. The consistency of these findings suggests that plyometric training is an effective method for improving kicking performance in pencak silat.

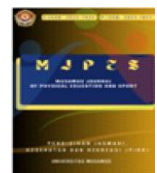
Therefore, plyometric training using Single Leg Lateral Hop and Straddle Hops exercises can be considered an effective alternative training program for improving the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil. This discussion demonstrates that the systematic and continuous implementation of plyometric training can support the improvement of kicking techniques required for achieving athletic performance in pencak silat.

Conclusions

Plyometric training was effective in improving the T-kick ability of pencak silat athletes at Tapak Suci Bukit Kecil. This was demonstrated by the increase in the mean T-kick score from 25.47 to 30.47, as well as the results of the paired-sample t-test, which showed a significance value of 0.000 ($p < 0.05$). Therefore, plyometric training can be used as an effective training method to enhance the kicking performance of pencak silat athletes. Based on the findings of this study, plyometric training may serve as an alternative training program for improving T-kick ability in pencak silat athletes. Athletes are encouraged to participate in training programs consistently and regularly to achieve optimal results. Future studies are recommended to involve larger sample sizes and explore different training methods to provide broader insights into the development of kicking performance in pencak silat athletes.

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Conflict of Interest

The authors declare no conflict of interest.

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