



The Effect of Plyometric Exercise on the Speed of the Sickle Kick in Pencak Silat Athletes at the HIMSSI Commissionarate of Seri Bandung

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ABSTRACTS

This research provides benefits for Pencak Silat athletes from the Indonesian Silat Arts Association (Himpunan Seni Silat Indonesia - HIMSSI) Commissionarate of Seri Bandung, in enhancing the speed of the Pencak Silat sickle kick (tendangan sabit) by utilizing the plyometric exercise method. The sickle kick is one type of attack technique in the Pencak Silat martial art that requires good technique, speed, and muscle coordination, especially in the leg muscles. Plyometric exercise is a training method designed to increase muscle strength and explosive power through explosive movements. This study employed an experimental method with a Pretest-Posttest One-Group design. The research sample consisted of Pencak Silat athletes who were purposively selected based on specific criteria. The plyometric training program was conducted for 6 weeks with a frequency of 3 times per week. The instrument used in this study was the sickle kick speed test, measured using a stopwatch over a period of 10 seconds, where athletes recorded the number of kicks they could perform within that timeframe. The results of the study indicated a significant increase in sickle kick speed after the implementation of the plyometric training program. This increase suggests that plyometric exercise is capable of optimally stimulating the work of the leg muscles, thereby improving kicking performance. Thus, plyometric exercise can be used as an alternative in programs to enhance sickle kick speed. This finding is expected to serve as a reference for coaches in designing more effective and measurable training programs..

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INTRODUCTION

Pencak silat is a traditional cultural heritage originating from the ancestors of the Indonesian nation, whose existence needs to be preserved and broadly socialized to the community (Lestari, 2017). Pencak silat is a high-achievement sport; to improve, every athlete requires training to consciously perfect the athlete's quality and maximize their performance. This training involves regular, directed, and gradual physical and mental loads, as well as repetition (Anhar, 2023). Kicking is an effective technique in Pencak Silat—a technique that is difficult for the opponent to predict, evade, block, or catch. Nevertheless, every kick must still be based on the principles of basic movement (Ryan Mulya Abdurahman). The lack of speed in the sickle kick among Pencak Silat athletes at the HIMSSI Commissionarate of Seri Bandung is one of the obstacles observed by the researcher.

This deficiency in sickle kick speed among the athletes of this martial arts school results in sub-optimal achievement, particularly in the fighter category. According to Irfan Et Al., 2020, the function of plyometric exercise is to achieve maximal strength in the shortest possible time (Putri Cicilia Kristina, 2022). According to Subiyanto, 2005; Santika, 2017, one element required by athletes is strength, which is the ability of a muscle group to overcome a load while performing an activity (Jujur Gunawan Manullang, 2022).

Training sport, or more commonly known as exercise, is a planned, systematic, and continuous process designed to improve an athlete's performance in a specific sport or enhance general fitness (Prof. Dr. Beltasar Tarigan, *Merancang Latihan Olahraga Populer*, 2024). Speed is the muscle's ability to stimulate within the shortest possible time. Speed is a combination of stride length and step count, and it is a basic biomotor component required in every sport (Bayu Iswana, 2013). According to Boutera et al., plyometric training starts from low, moderate, up to high intensity. Movements in low-intensity exercises are designed to be as simple as possible as a process of warming up and adaptation (Farid Rahman, 2023). A jump in place is a jump performed by landing in the same spot where the jump began. Jumps in this category are also known as stationary jumps and single or double-response jumps (Donald A. Chu, 2013, p. 110). Standing jumps usually start from an athletic stance and emphasize maximal effort in both horizontal and vertical directions. This effort can be single or double, and the athlete must use a fully extended arm swing to develop as much force as possible into the ground. These jumps are excellent for developing initial speed and body acceleration (Donald A. Chu, 2013, p. 121). A row of 6 to 10 cones or small barriers (8 to 12 inches, 20 to 30 cm, high) are set up approximately 3 to 6 feet (91 to 183 cm) apart. Start by standing with both feet shoulder-width apart at the end of the barrier row (with both feet open in front of you) (Donald A. Chu, 2013, p. 117). Start by extending one leg far forward, front to back, and bend the front knee 90 degrees at the hip and 90 degrees at the knee. Perform a jumping motion upward, use the arms to assist the lift, and hold the split-squat position. Land in the same position and

immediately repeat the jump. Try to straighten the legs and hips when you jump. Remember that the ankles, knees, hips, and torso all play a significant role in achieving maximum height during jumping and in achieving speed when running (Donald A. Chu, 2013, p. 117). The Hurdle Drill serves as a means of plyometric exercise designed to develop strength, speed, agility, coordination, and body balance (Sela Agustina, 2022).

Based on the formulation of the problem, and to answer the hypothesis or tentative answer in this study, it is posited that 'the effect of plyometric exercise on the speed of the Pencak Silat sickle kick in HIMSSI Commissionarate of Seri Bandung athletes' results in an increase in the speed of the Pencak Silat sickle kick by using plyometric exercise, which aims to increase the strength of the leg muscles to produce sickle kick speed.

METHOD

In this study, two variables were used:

1. Variable X / Independent Variable: Plyometric Exercise
2. Variable Y / Dependent Variable: Sickle Kick (Tendangan Sabit)

The research employed a one-group pretest and posttest research method. In this study, a pretest was administered to obtain accurate initial results that could be compared with the subsequent posttest results.

The research location was at the Indonesian Silat Arts Association (Himpunan Seni Silat Indonesia - HIMSSI) Commissionarate of Seri Bandung, located in Tanjung Baru sub-district, Ogan Ilir Regency, South Sumatra Province. The study was conducted over a period of 16 meetings. The Pencak Silat training at the HIMSSI school is held 3 days per week. The duration of the entire study was 2 months.

Based on this research, the researcher took a sample of 10 youth athletes, consisting of 5 females and 5 males. This study utilized the saturated sampling technique. Saturated sampling is a technique used when the population is too small, and therefore, the entire population is used as the research sample (Sahir, 2021).

The data collection technique is the method used by the researcher to obtain information for the research. This study used a test as the primary measurement tool for speed. The strategy in the data collection method involved a Pretest and Posttest, where the pretest was conducted to determine the ability before the treatment was given, and the posttest was conducted to determine the improvement after the treatment was carried out.

A study requires instruments; the tools in the research function to measure various observed symptoms or aspects (Sugiyono, 2021). In this study, three data analysis techniques were used, including: Normality Test, Homogeneity Test, and Hypothesis Testing. Hypothesis testing allows

for the calculation of the t-test result with a certain probability. If the calculation output shows a t-statistic lower than the t-table value at a 5% significance level, then the alternative hypothesis is rejected. Conversely, if the calculated t-statistic is equal to or higher than the t-table value at the 5% level, the proposed hypothesis is accepted.

RESULTS AND DISCUSSION

The implementation of this research adhered to a highly structured and systematic protocol, encompassing a total of 16 scheduled meetings. This comprehensive figure accounts for all sessions, including the crucial baseline measurement (pretest) and the final evaluation (posttest). This structured duration was intentionally designed to parallel the progression of a typical one-semester training cycle, thereby providing a realistic timeframe for physiological adaptation to occur. The training methodology adopted a progressive overload principle, beginning the intervention with exercises administered at a low intensity to ensure proper adaptation and technique acquisition. Over the course of the 16 meetings, the intensity was gradually and strategically escalated to higher levels, aligning with established sports science guidelines for maximizing performance gains.

The central variable of this study, the independent variable (Variable X), utilized the plyometric exercise method. The program was specifically constructed using a diverse repertoire of five distinct plyometric drills, chosen for their capacity to enhance explosive power in the lower limbs. These core exercises included: the Jump in Place (emphasizing vertical power and quick ground contact), the Split Squat Jump (targeting powerful extension and muscle coordination), the Standing Jump Over Barrier (focusing on obstacle clearance and reactive strength), Front Cone Hops (improving agility and repetitive bounding), and the Hurdle Drill (developing rhythm, foot speed, and elasticity). The primary function of these diverse plyometric drills was to vigorously train and significantly enhance the maximum strength and explosive power of the leg muscles in the participating athletes.

The theoretical foundation underpinning this intervention links the enhanced explosive power of the leg muscles directly to the study's dependent variable (Variable Y): the speed of the sickle kick (*tendangan sabit*). The core aim was that the increased leg strength generated by the plyometric routine would translate into greater kicking velocity. To quantitatively assess this relationship, the research employed rigorous data processing steps. This involved analyzing and comparing the raw numerical scores obtained from both the initial pretest and the final posttest. The speed of the sickle kick was measured objectively and standardizedly using a dedicated 10-second test, during which the maximum number of successful kicks performed by each athlete was recorded as the primary measure of speed performance. The results of the testing can be seen in the table below:

Table 1. Paired Sample Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest-	-	3,39280	1,07290	-	-	-	9	0,006
	Posttest	3,80000			6,22706	1,37294	3,542		

Based on the initial and final test results for sickle kick speed among the athletes of the Indonesian Silat Arts Association (HIMSSI) Commissionarate of Seri Bandung, the data were processed using the Normality Test. The One-Sample Kolmogorov-Smirnov test indicated that the Asymp. Sig. values were 0.103 for the initial data and 0.200 for the final data. Since both the initial and final results show an increase above 0.05, the data is considered normally distributed. Therefore, the results of the training using the plyometric exercise method show a significant increase in speed, as evidenced by the data processing using the One-Sample Kolmogorov-Smirnov test.

Next, the Homogeneity Test was performed using the initial and final test scores. The results indicated that the sickle kick speed ability data possess a uniform variance. Based on the Test of Homogeneity of Variances table, a significance value of 0.016 was obtained, which is greater than the significance level of 0.05. Thus, the null hypothesis is accepted, which means that a significant variance exists. The training method for the sickle kick utilizing plyometric exercise has a homogeneous variance.

Following the homogeneity results, the Paired Samples T-Test method was subsequently employed. From the results of the Paired Samples T-Test, it can be concluded that the training designed to increase sickle kick speed using the plyometric exercise method does have an effect on the sickle kick speed of the Pencak Silat athletes from the Indonesian Silat Arts Association (HIMSSI) school. The significance value obtained was 0.06. Since this figure is greater than 0.05, the results can be stated as statistically significant.

CONCLUSION

The study concerning the effect of plyometric exercise on the speed of the Pencak Silat sickle kick in HIMSSI Commissionarate of Seri Bandung athletes yielded definitive results that support the research hypothesis. The statistical evidence confirmed the validity of the data and the efficacy of the intervention. Specifically, the Normality Test indicated that both initial (0.103) and final (0.200) data scores exceeded the 0.05 threshold, establishing a normal distribution. Furthermore, while the Homogeneity Test returned a value of 0.016, the critical Hypothesis Testing (Paired Samples T-Test) produced a significance value of 0.006. Since this final p-value of 0.006 is significantly lower than the standard $\alpha=0.05$ level, it confirms that plyometric

exercise has a statistically significant and tangible effect on increasing the speed of the sickle kick in this specific group of Pencak Silat athletes. This significant improvement in kicking speed is attributed directly to the physiological adaptations induced by the plyometric training. The training method successfully led to an increase in leg muscle strength, which in turn generated the necessary explosive power. This explosive power is a crucial bio-motor component required for both rapid execution and force production in the Pencak Silat sickle kick technique. Consequently, based on these findings, plyometric exercise is highly recommended and validated as an effective and essential reference method for coaches and trainers aiming to specifically enhance the speed and technical performance of the sickle kick among Pencak Silat athletes.

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