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The Effect of Single Leg Bound and Split Jump Training on The Straight Kicking Ability of Athletes Dikapasita

Dwinda Rusdiana[1]✉, Andi Rahman[2], Siti Ayu Risma Putri[3], Muhsana El Cintami Lanos[4]

Universitas PGRI Palembang, Palembang, Indonesia[1234]

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Abstract

Low ability of straight kick to Dikapasita martial arts athletes in Teluk Jaya while competing is one of the problems that are emphasized in this study. This study aims to determine the influence of single leg bound and split jump training on Dikapasita straight kick martial artist. This research type is experimental research with an experimental training control design design using a pretest-posttest two group design method. The research subjects were 20 Dikapasita male martial artists in the teenager age category divided into two treatment groups. Data collection techniques use a test and measurement by a straight kick trial test that is carried out before and after providing treatment as well as posttest. The data analysis technique uses descriptive statistics to find out the mean value as well as inferential statistics in the form of t-test at a significance level α= 0.05. The results showed that the average leg straight kick ability in single leg bound training group increased from 17 to 26, whereas the split jump training group increased from 18 to 26. The t-test results show a significant increase in both groups, namely the single leg bound group with t count 25.735 > t table 1.761 and the split jump group with t count 14.720 > t table 1.761. From the results of the study, it can be concluded that single leg bound and split jump training have a significant effect on increasing the ability of Strainght kick martial artists Dikapasita, but single leg bound training is more effective than split jump training.

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✉ Correspondence address :
E-mail: dwindarusdiana120601@gmail.com

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INTRODUCTION

Pencak Silat has developed from a cultural heritage into a competitive sport with increasing national and international exposure (Nugroho, 2020; UNESCO, 2019) . In match situations, athletes are required to execute scoring techniques rapidly and accurately under pressure, where small performance differences can determine winning outcomes (Schmidt & Wrisberg, 2008) Among the commonly used attacking techniques, kicking actions are reported as the most frequently applied techniques in pencak silat competition, and the straight kick (kick) straight) is commonly used because it targets valid scoring areas and provides a scoring advantage compared with punches in the official scoring structure (Nugroho, 2020) . Therefore, because competitive athletes increase the speed of execution of straight kicks, it actually prioritizes the main performance (Chania et al., 2021; Wali et al., 2023) .

Note that despite the above training in general, the training environment may still emphasize overall lower limb strength training, without appropriately targeting the specific speed-strength and neuromuscular demands required for such fast kicking performance.(Vladimir M. Zatsiorsky et al., 2020) . 2017) . This practical issue highlights an urgent need for training strategies that specifically enhance lower-limb explosive capabilities and movement speed in patterns that transfer to straight-kick mechanics (Bompa et al., 2009; Markovic, 2007) .

Pylometric One training paradigm designed to develop explosive strength and speed through rapid muscle stretching and shortening is plyometric training. Several studies have shown that plyometric training improves athletes' physical performance, particularly in martial arts. In pre-competition training, coaches often use variations of single-leg jumps and split jumps. The rationale is that these exercises emphasize rapid force production, lower-extremity coordination, and re-negotiated explosive movement patterns, all of which impact faster and more effective kicking performance. Data from initial observations conducted during training sessions and competitions of Dikapasita Teluk Jaya pencak silat athletes showed low straight kick speed. The initial kick movement was not very explosive, the takeoff phase was not optimal, and the kick execution time was slower, making it easier for opponents to catch and anticipate. Observations also showed that the previously provided training variations were general and not specific to the development of the cool-down period related to straight kick technique. There is no currently published evidence to determine whether the single leg bind or split jump is more effective in developing straight kick speed in pencak silat in direct comparison, especially in community female athletes. Therefore, this study was conducted to determine the effect of single leg bind and split jump training during guided session training on straight kick speed in pencak silat fait Teluk Jaya through a pretest–posttest two group design experiment.(Chania et al., 2021; Islamiyah, 2021).

METHODS

(Sugiyono, 2017) This study used an experimental approach with a two-group pretest-posttest design. Participants were assessed before the intervention and given a training program as treatment, and then assessed after the intervention to identify changes caused by the training. The research sample consisted of 25 silat martial arts athletes, 20 males and 5 females aged 14-16 years. The sample consisted of 20 male athletes, selected using purposive sampling based on eligibility and relevance to the research objectives. After selection, the sample was divided into two experimental groups using ordinal pairing, a matching procedure designed to balance baseline histories between groups. Group A received the single leg bound intervention, while group B received the split jump intervention, ensuring that both groups were comparable before the treatment period. The research was conducted at the Dikapasita martial arts silat club, Teluk Jaya Village, Kelekar District. The intervention period lasted one month, with training implemented four sessions per week and also conducted during national holidays to maintain the planned training frequency and ensure completion of the program.

(Arikunto, 2010) The population consisted of 25 people Both groups completed 16 training sessions during the one-month intervention period. Each session followed a consistent structure, including a warm-up, a main training session, and a cool-down, to maintain safety and standardization. The key difference between the groups was the type of plyometric exercise used in the main training segment. The first group performed four single-leg jump exercises. Each session followed a consistent structure consisting of warm-up, main training, and cool-down to support safety and training standardization. The key difference between groups was the plyometric exercise assigned during the main training segment. Group A performed single leg bound drills, characterized by repeated forward bounds using alternating

single-leg takeoffs to stimulate lower-limb explosive power, balance, and coordination. Group B performed split jump drills, involving explosive jumps from a split stance and landing with the opposite leg position, emphasizing lower-limb power, agility, and dynamic stability. Aside from the primary exercise variation, the training schedule and overall implementation procedures were kept consistent between groups to isolate the effect of the intervention type on straight-kick speed.

Straight-kick speed was assessed using a straight-kick speed test administered twice: once during the pretest and once during the posttest. In this test, athletes performed the maximum number of straight kicks within 15 seconds. Each participant completed three trials, and performance was recorded objectively based on the number of kicks achieved within the test duration. The testing protocol was applied consistently across both measurement sessions to ensure comparable results and minimize procedural bias.

Descriptive statistics (mean and dispersion) were computed for straight-kick speed performance before and after the intervention in each group. Before hypothesis test, prerequisite tests were performed such as normality test (with cut-off value 0.05) and homogeneity of variance (to ensure the assumption for parametric test). When assumptions were met, inferential statistics were run with t-tests to determine training effects on straight-kick speed. The sub analysis tried to answer the following three questions: (1) Does single leg bound and split jump training cause a significant pre–post difference? (2) Does split jump training cause significantly greater pre–post differences than single leg bound training? All statistical analyses were performed at a 5% level of significance ($p < 0.05$).

RESULTS AND DISCUSSION

Table 1. Summary of straight-kick speed scores (n=10 per group)

Group	Pretest (Mean ± SD) Min–Max	Posttest (Mean ± SD) Min–Max	Mean increase (Post–Pre)	explan
Single leg bound	18.20 ± 1.317 (16–20)	24.90 ± 1.524 (22–27)	+6.70	Normal
Split jump	17.70 ± 1.059 (16–19)	26.60 ± 2.171 (22–29)	+8.90	Normal

Table 1 summarizes the straight-kick speed scores in both groups (n=10 per group). The single leg bound group improved from a pretest mean of 18.20 ± 1.317 (min–max: 16–20) to a posttest mean of 24.90 ± 1.524 (22–27), indicating a mean increase of +6.70.

The split jump group improved from a pretest mean of 17.70 ± 1.059 (16–19) to a posttest mean of 26.60 ± 2.171 (22–29), indicating a mean increase of +8.90.

Normality testing using the Kolmogorov–Smirnov test showed that both pretest and posttest data were normally distributed ($p>0.05$) for the single leg bound group (pretest $p=0.099$; posttest $p=0.088$) and for the split jump group (pretest $p=0.089$; posttest $p=0.200$).

Homogeneity testing (Levene's test) also indicated homogeneous variances ($p>0.05$) for both groups: single leg bound $p=0.054$ and split jump $p=0.082$.

The paired-samples t-test results showed a significant improvement in straight-kick speed after the intervention in both groups. In the single leg bound group, the change was significant ($t=25.735$, $df = 9$, $p=0.000$). In the split jump group, the change was also significant ($t=14.720$, $df = 9$, $p=0.000$).

This study examined the effects of single leg bound and split jump training on the straight-kick speed of Dikapasita martial arts martial arts athlete. Straight kick is a fundamental attacking technique in pencak silat that requires the athlete to deliver a forward strike with adequate speed, force, and target accuracy (Iswana, 2019; Rogelio T. & Morbo, 2025) . Functionally, a straight kick can be used for direct-attack offense, stopping an oncoming attack, maintaining a safe distance, or set-up other actions. Mechanically, the kick is initiated from a stable stance; the supporting leg maintains balance while the striking leg is lifted and extended rapidly forward, assisted by hip drive and strong thigh muscle contraction so the kick reaches the target area efficiently (eg, abdomen, chest, or chin depending on the situation). Because opponents can counter by anticipating or catching the kick, execution speed becomes a decisive factor in real match settings.

In order to execute the straight kick successfully, players need to possess good balance, movement coordination and lower limb strength, as well as agility and accurate timing in which not let the opponent knows (Abarghoueinejad et al., 2021) . These attributes are generally developed from vigorous and repetitive practice, as well as increasing conditioning levels that will improve body management and over-stretch ability. In this regard, plyometric training is of interest as it can encourage rapid force production, neuromuscular coordination and stretch–shortening cycle properties that may influence limb acceleration during the execution of kicking actions.

Before answering the research hypotheses, a data test was first conducted to check whether

the data could be used as parametric statistical data. The Kolomogorov-Smirnov test showed that the pretest and posttest scores in the group were normally distributed with Asymp. sig at 0.200 and 0.200, respectively, which is significant ($p > 0.05$). Furthermore, the homogeneity of variance test showed that the data between groups were homogeneous, as indicated by the Asymp. sig in the single leg bound group of 0.054 and the split leg group of 0.082 ($p > 0.05$). Therefore, in experimental research related to sports, using the t-test as a data analysis technique has been effective and is in accordance with the rules of the parametric statistical approach (Sugiyono, 2017; Field, 2018).

Based on a paired t-test, both types of training, single leg bound and split jump, significantly increased the straight kick speed of pencak silat athletes. The entire single leg bound group experienced a significant increase, with a t-value of 25.735 ($p = 0.000$). This also applied to the split jump group, with a t-value of 14.720 ($p = 0.000$). Therefore, statistically, structural plyometric training can improve neuromuscular performance or increase leg movement speed, enabling the execution of straight kick techniques (Bompa & Haff, 2009; Chania et al., 2021).

The significant increase in straight kick speed in both groups can be explained by the principle of plyometric training, which emphasizes the use of the stretch-shortening cycle, enabling the muscles and nervous system to generate greater force in a shorter period of time. This principle influences kick execution and speed. Clinically, this is manifested in an athlete's ability to execute more straight kicks in the same amount of time after treatment. Further studies also demonstrated previous research on the impact of plyometric training on martial arts athletes; plyometric training has a significant effect on movement motives and coordination of martial arts athletes (Islamiyah, 2021; Markovic & Mikulic, 2010). However, when comparing the two training methods, the results of this study indicate that single leg bound training has a greater effect than split jump training. This result is indicated by a higher t-value in single leg bound. This can be explained by the principle of training specificity, namely that single leg bound emphasizes single leg push-off, unilateral stabilization, and coordination of the hip, knee, and ankle joints, which resembles the mechanics of the supporting leg movement during a straight kick. Therefore, single leg bound has a greater transfer to the biomechanical requirements of the straight kick in pencak silat (Schmidt & Wrisberg, 2008; Bompa & Buzzichelli, 2019).

Meanwhile, split jump training continues to exert a significant effect on the SA acceleration because it helped to develop the power reactive capability and the coordination capacity of the limbs in general. However, the split jump moved pattern are not relatively specific to the preferential one-leg support on the front used in SS kicking. This could be an explanatory factor as to why the effect is generated by split jump, although significant, is noticeably puller that of the single leg bound. This finding confirms the idea on the meaningfulness of the exercise pattern compatibility with the movements specific of the sports technique. Along with the principle of analogical movements, this principle influence the effectiveness of the training effect as well Behm & Sale, 2022; Chania et al., 2021). In conclusion, from this study, it drew that the second plyometric training program for PSG sportsman can increase the SA straight kick of Dikapasita athlete. However, the notable recommendation for single leg bound plyometric is recommended as the primary method for increasing speed in the kick. It can be used to base on the training, focusing more on the single leg bound exercise as the primary stimulus, and a split jump plyometric pattern of movement can be used as the accessory for develop the explosive of an athlete. Further research is prescribed to expand generalizability in different training needs, including a control group, longer training periods, and a broader diversify sampling Sugiyono, 2017; Bompa & Haff, 2009).

CONCLUSION

As, the two training protocol produced substantial gains in performance and coaches are encouraged to incorporate plyometric exercises with focus on speed-based kicking activities for supplementing pencak silat-specific conditioning programmes. Single leg bound might be an exercise of choice, whenever the interest is in improving straight-kick speed as it showed the greatest effect in this intervention. The programme must be delivered on a typical session (i.e., warm up main drill cool down) and with progression in work load to induce save landing mechanics that may be beneficial for lessening injury risk. It is recommended that athletes continue to attend sessions and practice the drills in this way (stable trunk, controlled landing, explosive take-off) in order for these speed changes to be maintained and applicable to match play. These results suggest that both programs are effective, however the single leg bound program might be preferred for

increasing straight-kick speed. At the coaching level, this also has practical implications: Structured SL position bound drills performed in regular training may be a more specific stimulus to enhance kick speed, whereas split jump can still act as supplementary exercise enhancing general explosive ability and dynamic leg coordination. Future investigation could include a non-training control group, prolonging the duration of the intervention and including more representative participant characteristics (eg, female athletes or different skill levels) to improve generalisation and identify which athlete profiles are best responded to by each plyometric type.

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