

The effects of a 6-week plyometric training on muscular strength performance in silat athletes

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Abstract

The aim of this study was to investigate the effect of 6-week plyometric training on muscular strength in young silat athletes. Thirty-four male silat exponents ($M_{age} = 14 \pm 3.22$ years) were randomly assigned to a control or experimental group ($n = 17$ for each group). The experimental group participated in conventional silat workout routine three times a week for one-hour session plus plyometric training two times a week for one-hour session. The control group performed conventional silat workout routine three times per week for one to two-hours session. The one repetition maximum (1RM) squat test was used three times (pre-, mid- and post-test). Results revealed that muscular strength performance improved for the experimental group. This improvement was 9.16% between pre- and mid-test, 18.81% between mid- and post-test, and 29.7 % between pre- and post-test. Plyometric training was shown to be effective to improve maximum strength of young silat athletes.

Keywords: Malay sports, martial arts; combat sports; silat; sports training.

1. Introduction

Leg strength is a variable that improves performance in many sports. Traditionally, grappling combat sports as silat rely more on maximum strength than striking combat sports due to the close contact between athletes during the match and the need of maximum strength during groundwork actions (Shapie, 2011). Plyometric is a training method that have been proposed to increase muscular strength and power (Chu, 1998). In martial arts and combat sports, studies such as Singh's (2012) revealed that six-week weight training and plyometric training improved lower body strength of male taekwondo athletes. Nevertheless, specific studies on silat, a MA&CS characterized by high demands on the lower body, are lacking.

2. Objectives

The objective of this study is to determine the effect of plyometric training on the muscular strength in silat.

3. Methodology

Thirty-four male silat athletes from the Selangor state team, with less than two years of experience and not suffering from any lower extremity injury, participated in this study. They were randomly assigned to an experimental ($n = 17$; $M_{age} = 16.65 \pm 2.20$ years; $M_{height} = 164.15 \pm 9.55$ cm; $M_{weight} = 61.66 \pm 11.85$ kg) and control group ($n = 17$; $M_{age} = 17.59 \pm 2.06$ years; $M_{height} = 163.41 \pm 8.24$ cm; $M_{weight} = 61.66 \pm 11.85$ kg).

The intervention training program consisted of a conventional silat training and a plyometric training program. Conventional silat training was carried out for one hour three times a week (Monday, Wednesday and Friday) and included tactical, technical, and individual skills and

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sparring. Plyometric training was carried out for one hour two times a week (Tuesday and Thursday) and followed the recommendations by Piper and Erdmann (1998). The training loads were progressively increased in terms of volume (90-140 foot contacts), training drills, repetitions, sets and the intensity was set from low to high. The training hours were programmed for one-hour session per day to avoid participants' fatigue during the intervention. The training program for the control group consisted of tactical, technical, endurance training, and individual skill and sparring, three times a week (Monday, Wednesday and Friday) for one to two-hour session. The total training hours for both groups was five hours per week.

The 1RM squat test (knee flexion at 90°) was used to assess maximum strength performance before (pre-test/ 0 week), middle (mid-test/ 3rd week) and after (post-test/ 7th week) of the intervention. Each athlete performed between three and five trials, with three to five-minute rest between them. ANOVA tests were used to compare 1RM test results at the intra-group level.

4. Results

The mean weight lifted by the control group was 74.12 ± 20.32 kg in the pre-test, 74.12 ± 20.32 kg in the mid-test and 77.06 ± 21.14 kg in the post-test. The experimental group reported 77.06 ± 24.94 kg in the pre-test, 84.12 ± 25.99 kg in the mid-test and at 100.0 ± 25.49 kg in the post-test (Figure 1). The 1RM test results reported no significant differences ($p > 0.05$) in the control group across the observations, but differences were found for the experimental group ($p < 0.001$).

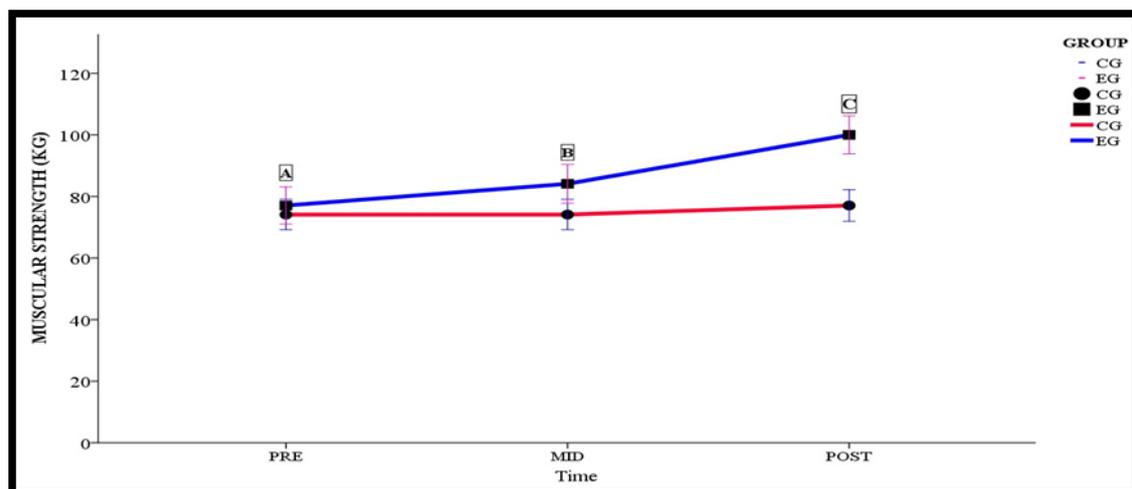


Figure 1. Mean scores for the control and experimental groups across the training program.

5. Discussion and Conclusion

After of 6-week plyometric training, the improvement in 1RM test of the experimental group was 29.7% (9.16% between pre-test and mid-test and 18.81% between mid-test and post-test). These positive findings proved the efficacy of plyometric training on the muscular strength of the silat athletes. Several reasons may have contributed to these results. First, the effectiveness of plyometric training and its nature have contributed on the hip and thigh strength by restoring few physiological changes of this progressive improvements. Agreed with Hakkinen et al. (1979), this was due to the neural adaptations such as increased in motor unit excitability, increased in efferent motor drive, increased in motor unit synchronization, and increased in motor unit firing frequency.

And secondly, conventional silat training includes several elements that demand lower body strength, such as powerful kicks and jumps (Shapie, 2011; Aziz et al., 2002), which also explain the maximal strength improvements achieved by the experimental group. Indeed, there are plenty of common silat movements, such as *guntingan* (movement to perform kicking) or *jatuhan* (movement to perform catching and grounding of opponents) that silat athletes could improve by gaining muscular strength on the lower part of the body, through plyometric training. In addition, this study supported that plyometric training – following Piper and Erdmann's (1998)

recommendations – can be compatible with conventional silat training to induce a positive effect on muscular strength.

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