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Continuous Applications of Thai Massage Program on Lower Limbs Promotes Vertical Jump in Male Collegiate Volleyball Players, Burapha University, Thailand

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ABSTRACT

Background: The practice of Thai traditional massage has not been reported as a part of sport preparation to increase athletic performance. **Objective:** To investigate the effects of the Thai massage program on vertical jump (VJ) performance in male collegiate volleyball players. **Results:** Applications of Thai massage program in the other day, for three days, increase VJ performance significantly different from control group. **Conclusion:** Continuous applications of Thai massage program on lower limbs is able to increase VJ. Hence, this massage program could improve the athletic performance and used as preparing for training or competition.

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INTRODUCTION

Thai traditional massage is the manual practice with human body. It is used as an integral part of the therapeutic strategies and rehabilitation (Buttagat *et al.*, 2012b; Netchanok *et al.*, 2012). Thai massage is focused on the energy production, flow, and balance. Several techniques are consisted of gentle thumbing and rhythmic palming to energize, stimulate and stretch the muscles (Eungpinichpong, 2004). It also has many benefits including the improvement of blood circulation and skin temperature (Chenpanich & Tuchinda, 1981), the reduction of muscle spasm and fatigue (Phungphai, 2007; Pitthachai, 1997). The additional benefits are also improve flexibility, and joint mobility (1988; Buttagat *et al.*, 2012a).

Volleyball is played worldwide. It requires agility, strength of muscle and high explosive power to jump. Therefore, the quick movements of the lower extremities are needed to achieve and win the competition which requires the effectively powerful muscle contraction such as jumping (Putichan, 2003). There are several factors that affect the performance of the athletes, for example; skill training period, strength training program, and sport preparation including the warm up. Warm up is the process to increase the temperature, stimulate neuromuscular system, prepare the body for exercise or competition and prevent injuries. Several ways of warm up are applied to athletes in common to enhance the performance and remain until the end of the game (Sudhamraksa, 2003). The massage is a great way for preparing the body and muscles to work harder with external stimulation for practicing the next movement (Arabaci, 2008; Barlow *et al.*, 2004). Though, massage has been widely used in sport, Thai massage, the ancient knowledge, is still lack of scientific evidences to support the benefits in sport preparation, especially in enhancing the performance. Therefore, this study aims to investigate the effects of the Thai massage program on vertical jump performance in male collegiate volleyball players.

MATERIALS AND METHODS

Subjects:

Twelve male collegiate volleyball players (age between 18-22 years), with no severely illness or injuries of muscle and tendon at both lower limbs at least 6 months before the test, participated in this study. Following approval from the Faculty of Sport Science Ethical Review Board, all subjects read and signed an informed consent form prior to starting the experimental procedures.

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Experimental design:

The subjects were randomly divided into two groups; experimental (N = 6) and control groups (N=6). They were asked for participation at the same time of day, every other day, for three days. Before starting the tests, the subjects were questioned about their compliance and injuries. Then, the subjects were measured vertical jump (VJ) performance for pre-test. The modified Thai massage program for lower limbs was applied to the experimental group for 30 minutes, but the control group sat still for 30 minutes. Then, all subjects were measured VJ for post-test.

Vertical jump (VJ) test:

Subjects were asked to perform two VJ tests from standing position using vertical jump meter (TKK No. 69-4-10, Football Thai Factory Sporting Goods Co., LTD., Thailand) before and after intervention of Thai massage program every other day for three days. The data were collected before and after the applications of Thai massage program. Then, the mean differences (MD) of VJ were calculated from the changed score as the following solution: Changed score = VJ of posttest - VJ of pretest

Thai massage program on lower limbs:

The modified Thai massage program for lower limbs which is developed from Thai traditional massage (2011). This program was applied every other day for three days. With the gentle thumbing, each lower extremity of the subject was treated for 15 minutes by the experts. The modified Thai massage program for lower limbs was applied to the experimental group for 30 minutes but the control group sat still for 30 minutes.

Statistical analysis:

The descriptive statistics of means and standard deviations were used to describe the vertical jump measures and the characteristics of subjects such as age, height, body weight. A multivariate analysis of variance (MANOVA) and repeated measures analysis of variance (ANOVA) were used to analyze the mean differences of control-experiment tests. All statistical analyses in this study were conducted using SPSS statistical software version 16 (SPSS Inc., Chicago, USA) with statistical significance accepted at the $p < 0.05$ level.

Results:**Physical characteristics:**

The physical characteristic of subjects including age, weight, and height were shown in Table 1.

Table 1: Subjects' characteristics; age, weight, and height of experimental and control groups.

Parameter	Mean	S.D.
Age		
Experiment (n = 6)	20.5	1.64
Control (n = 6)	20.33	0.52
Weight		
Experiment (n = 6)	75.33	10.61
Control (n = 6)	68.17	4.45
Height		
Experiment (n = 6)	177.33	1.37
Control (n = 6)	177.00	4.15

Acute effects of the modified massage program on the vertical jump (VJ) performance:

For every other day, the VJ tests were examined before and after applying the modified Thai massage program for lower extremities. The table 2 showed means and means differences (MD) of VJ performance before and after modified Thai massage program on lower limbs for three days in the both groups.

In each day of the modified Thai massage program application, the MD of VJ performances in the experimental group were not significant differences compared with those in the control group ($p > .05$). These results were found in all three days as shown in the table 2. However, the MD of VJ performances in the experimental group were tended to increase different from those in the control group (table 2).

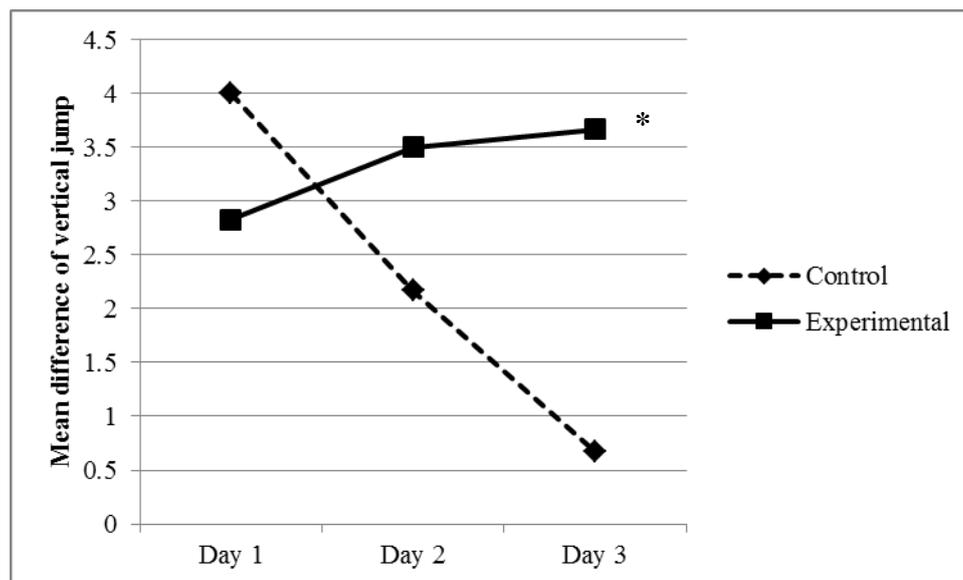
Continuous applications of the modified massage program for lower extremities enhanced the vertical jump (VJ) performance:

In this study, participants in the experimental group were applied the modified massage program in the other day for three days compared with those were sat still in control group. In the both groups, there was a significant difference of VJ performance mean differences (MD) compared within three days. The figure 1 showed the MD of VJ performance in the both groups in all three days. As shown in the figure 1, the MD of VJ in three days were significantly different in experimental group compared with control group ($\Lambda = 0.168$; partial $\eta^2 = 0.832$; $p = 0.002$).

Table 2: The comparison of mean differences (MD) of VJ performance between control and experimental groups in all three days. Means and MD of VJ performance before and after applications of the modified Thai massage program on lower limbs for three days in the both groups.

Groups		Vertical jump (VJ) performance					
		Day-1		Day-2		Day-3	
		Mean (cm.)	Mean difference (MD)	Mean (cm.)	Mean difference (MD)	Mean (cm.)	Mean difference (MD)
Control	Pre-test	54.17	4.00	55.67	2.17	59.17	0.67
	Post-test	58.17		57.83		59.87	
Exp.	Pre-test	58.83	2.83	59.17	3.50	61.83	3.67
	Post-test	61.67		62.67		65.50	
Univariate Test of between-subject effects	F-Statistic	0.182		0.780		4.451	
	<i>p</i> -value	0.679		0.398		0.061	
	Partial η^2	0.018		0.072		0.308	

Exp. is an experimental group.



* Significant difference compared within three days ($p = 0.002$)

Fig. 1: Comparison of mean difference of the VJ performance in the both groups in all three days.

Discussion:

Western massage is used widely throughout sport preparation and recovery, whereas, Thai traditional massage is not used worldwide in sporting circles. Several techniques in Thai traditional massage are consisted of gentle thumbing and rhythmic palming to energize, stimulate and stretch the muscles (Eungpinichpong, 2004). With these practices, athletes also use massage in an effort to warm-up for training or competition (Callaghan, 1993; Drust *et al.*, 2003; Hemmings, 2001). However, the effects of Thai traditional massage for sport preparation are unclear or subjective. The aim of this study was to examine effects of the modified Thai massage program for lower extremities on VJ performance in male collegiate volleyball players in Burapha University, Thailand.

We measured VJ performance before starting the modified Thai massage program for lower extremities which is developed from Thai traditional massage (2011). The modified Thai massage program was applied to the experimental group for 30 minutes but the control group sat still for 30 minutes. Then, the subjects were examined VJ for the post-test. Our findings in the table 2 and figure 1 showed that the increases of mean difference (MD) of VJ performance in male volleyball players were found in the experimental group. Applications of the modified massage program for three days significantly enhanced the VJ performance compared with control group. However, in each day, the modified massage program did not affect the VJ performance.

The results in the table 2 suggested that acute effects of the modified Thai massage program on VJ performance were not shown, significantly. These results were consistent with the previous studies suggesting that the assessing massage techniques did not show significant effects on VJ (Mikesky *et al.*, 2002) or change in jump height (Hunter *et al.*, 2006). Again, the study measuring acute effects of Western massage techniques showed a significant worsening on VJ performance (Arabaci, 2008). Our results were also consistent with the previous report suggesting that there was no significantly different in drop-jump after application of either

petrissage or tapotement massage techniques compared with control group (McKechnie *et al.*, 2007). Moreover, the previous reports suggesting that there was no significantly different in VJ performance between the Western massage and rest condition (Hunter *et al.*, 2006).

Although massage techniques were used widely for sport preparation, there is no consensus on the type, style, application, duration, intensity, number of strokes applied, or the time of application prior to training or competition (King, 1993; Paine, 2000). Our results in the figure 1 showed that, in the both groups, there was a significant difference of VJ performance compared within three days. These results suggested that continuous applications of the modified massage program for lower extremities could promote the VJ performance. The massage techniques were used in the proper benefits, such as reducing in muscle stiffness, increasing muscle flexibility, range of motion, and helping to release restrictions in the fascia (Arabaci, 2008; Barlow *et al.*, 2004; McKechnie *et al.*, 2007). These findings may support the benefit that continuous applications of massage increase muscle flexibility and stimulate mobility of articulations (Cowen *et al.*, 2006; Holey & Cook, 2003).

Conclusion:

In conclusion, the results of this present study indicated that performing the modified Thai massage for lower extremities for 30 minutes in the other day for three days has an effect on vertical jump. In addition, the continuous applications of Thai massage program increase VJ performance significantly different from sat still. Thai massage was presented as an alternative method to increase VJ performance in a sport preparation.

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