ORIGINAL ARTICLE

The acute effect of different massage durations on squat jump, countermovement jump and flexibility performance in muay thai athletes

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Abstract

Background and Study Aim Muay thai is a combat sport in which the competitors kick, punch, knee, elbow and growl with their opponents. The strength of the leg muscles can increase the intensity of the kick and its flexibility is a well-known issue for this sport. Determining the most appropriate method for these issues provides important gains to the athletes. One of the methods applied to achieve these gains is acute massage applications. The aim of the study is to evaluate the acute effect of different massage times on squat jump, countermovement jump and flexibility performance.

Material and Methods Twelve healthy male muay thai athletes (age, 19.83± 1.46 years; height, 175.33± 7.91 cm; body mass, 65.16 ±13.36 kg) participated in the study, who exercised three times a week. The study consists of a single group. The study consists of 4 different massage duration protocols. These protocols consist of no massage (NM), five minutes massage (5MMSG), ten minutes massage (10MMSG) and fifteen minutes massage (15MMSG). Counter movement jump, squat jump, sitting and lying flexibility were measured after each massage period, respectively. All protocols were continued on consecutive days.

Results There was a significant main effect for flexibility (F = 10,872 ; p = 0.00), countermovement jump (F = 4.719 p=.008) and squat jump (F = 6.262 p=.002) performance. The best flexibility, countermovement jump and squat jump performance detected immediately after 5MMSG was respectively 35,16 ± 6,33; 37,17 ± 4,18 and next, 36,05 ± 4,68.

Conclusions As a result, it is recommended that different massage durations are effective in improving physical performance, and 5MMSG before competition is recommended for athletes and coaches to get more performance.

Keywords: combat sports, passive warm up, sit and reach

Introduction

As in numerous sports, strength-endurance parameters are one of the important physical parameters that determine success in combat sports [1]. Muay Thai, recognized as the national sport of Thailand and popular all over the world, is a type of kickboxing that allows kicks, punches, knees and elbows and is expressed as the "eight limb art" [2]. As in similar combat sports with muay thai, the main technical and tactical actions involve hitting the opponent [3], and reactive power, which defines an athlete's stretch-shortening cycle abilities, can be considered the basis for force generation in muay thai [4, 5]. In order to compete at a high level in combat sports such as Muay Thai, the athlete must develop strength, endurance, muscle strength, anaerobic and aerobic abilities [6]. According to Guidetti et al., [7] strength performance is among the important indicators in defense sports. While Muay Thai athletes work to increase their striking strength, they need to improve their ability to use these strokes regularly [8]. If the time available for strength development is less than 0.3 seconds, as in Muay Thai, it is assumed that it should focus on improving the speed of strength development [9, 10, 11]. Since the rate of strength development represents a function of neuromuscular activation [12] and an individual's ability to accelerate objects [9], many researchers recommend ballistic training to improve this quality [13-16].

It is known that before training or competition, athletes apply different warm-up protocols in order to increase their physiological and psychological capacities [17]. Accordingly, depending on the intensity and duration, different warm up protocols provide physiological, biochemical and psychological changes in the body [18, 19]. It is stated that in addition to physical warm-up, pre-exercise massage can be used [20] and muscle stiffness can be reduced by lengthening the massaged muscle [21]. Massage is a physical therapy intervention with psychological advantages by increasing flexibility, muscle temperature and blood flow, reducing muscle tension and pain, and preventing tissue adhesion by using hands or an accessory on the soft tissue of the body [22, 23]. It has been determined that self-massage does not reduce muscle strength or performance, and in addition increases flexibility [24], while massage application before stretching provides greater improvements in flexibility than stretching alone [24, 25]. Hemmings et al., [26] on the other hand, examined the effects of massage on repeated boxing performance using a boxing ergometer

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and stated that there was no difference in performance between the group that received a massage before the study and the group that did not.

The contribution of knowing the acute effect of different massage times on vertical jump, squat jump and flexibility performance in Muay Thai athletes to change the perspective of trainers and athletes is very important for the future of sports. In addition, the absence of a study in the literature that measured the acute effect of different massage durations on countermovement jump, squat jump and flexibility performance in muay thai athletes further increases the importance of the study. The aim of this study is to determine the effect of different massage durations on countermovement jump, squat jump and flexibility in muay thai athletes. For this purpose, as research hypotheses; (1) It is thought that flexibility performance will be positively affected in favor of 5MMSG.

Material and Methods

Participants

Twelve healthy male active muay thai athletes who exercise three times in a week voluntarily attended to this research (age, 19,83± 1,46 years; height, 175,33± 7,91 cm; body mass, 65,16 ±13,36 kg). Muay thai athletes trained for more than two years. To be included in the study, muay thai athletes should have had the following characteristics: (a) had at least 2 years of experience in the muay thai; (b) not have any functional limitation that could interfere in the tests performance; (c) not presented any medical condition that could influence the tests; (d) maintained their regular physical activity during the course of the study. Prior to participation, all subjects were briefed on the requirements and risks involved with the study. Parental consent was sought for subjects. The study started after the approval of the Research Ethics Committee of the institution (2021/2461). All tests and training practices were performed at the same time of the day (09.00-11.00).

Experimental Design of the Study

This study is available just one group in which was included twelve male muay thai athletes and there isn't any control group. Four different massage durations which have been applied with content for 48 hours. Twelve muay thai athletes into four different massage durations were randomly taken to exclude the cumulative effect. Throughout the familiarization session's muay thai athletes were familiarized with massage durations (NM, 5MMSG, 10MMSG, and 15MMSG). The entire massage durations carried at the same time of day (10.00 am, to avoid the effect of diurnal variations). Each massage durations started with 5 minutes of light-intensity aerobic jogging. Counter movement jump, squat jump, sit and reach flexibility were measured respectively after each massage durations (Figure 1). This study continued approximately 10 days. All protocols continued consecutive days. Sit and reach flexibility test was administered using a specially constructed box that had a slide ruler attached to the top. After one practice trial, the best score of three trials was recorded [27]. Three trials were performed for squat and counter movement jump test (Smart Jump; Fusion Sport, Australia). For each variable, the highest value of the three attempts was used for analysis.

Massage Protocols

Before starting the massage, the massage bed was wiped using disinfectant and covered with a clean disposable cover before each massage in order to ensure a hygienic environment. The temperature in the massage

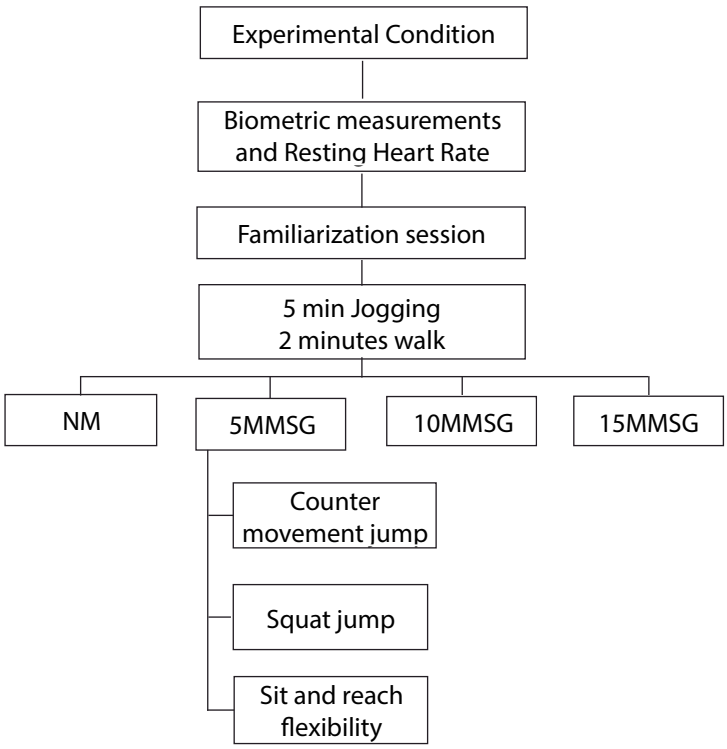

Figure 1. Experimental Design

room was adjusted to be 22-26 before each massage. All participants were massaged by the same masseur in order to ensure consistency between massage treatments applied to different athletes. After washing his hands, the expert masseur who will apply the massage poured about 3 ml of oil into his palms and started the massage by rubbing his hands to warm them. Aromatic oils, which affect the effect of the massage, were not used in the massage application. Approximately 30 ml of oil was used when massaging each participant, and the massage was done in the direction of the heart and muscle fibers. During the massage, Swedish massage was used, which can increase circulation [28] and flexibility [29], and eufluorage, friction, petrissage and pressing applications were made within Swedish massage [30, 31, 32, 33]. The original technique of Swedish massage also includes the tapotement technique, but the tapotement technique was not applied during the treatments as this process may increase muscle tension [34]. There are 4 different massage protocols and durations as no massage (NM), five minutes massage (5MMSG), ten minutes massage (10MMSG) and fifteen minutes massage (15MMSG). All massage protocols started after the participants were given detailed information about the test, before the test started, the participants' maximum heart rate was determined [35]. Then, warm-up rate of jogging each individual was calculated as 30-40% according to the heart rate [36]. Participants in the study were warmed up under the control of experts. In this way, both the warm-up intensity and the warm-up differences between the participants in the study were eliminated. Participants were asked to walk for 2 minutes until their heart rate was between 110-120 per minute. The massage protocols was performed for the following muscle groups (calf, quadriceps, adductor, hamstring and hip rotator) in all massage durations.

Statistical Analysis

The obtained data were analyzed in SPSS (25.0) package program. "Repeated Measures Anova" was used to determine the effect of different massage protocols on countermovement jump, squat jump and sit and reach flexibility. "Bonferroni" analysis, one of the multiple comparison tests, was used to determine which massage protocol favored the performance. Mauchly Test was used for homogeneity of variances and Greenhouse-Geisser correction factor was used to correct for variances. The significance level was chosen as $p<0.05$.

Results

Figure 2 shows a comparison between flexibility, squat jump and counter movement jump values for NMSG, 5MMSG, 10MMSG and 15MMSG. It was determined that there was an increase in flexibility, squat jump and counter movement jump performance values observed after 5MMSG (35,16±6,33; 36,05±4,68; 37,17±4,18) protocol. Also flexibility [F(1,693)= 10,872 p=.000, partial eta squared: ,497], squat jump [F(2.380)= 6.262 p=.002, partial eta squared: ,363] and countermovement jump [F(1.757))= 4.719 p=.008, partial eta squared: .300] values indicate a statistically significant difference between all protocols (p<.05). Performance improvement in squat jump parameters was determined as 5MMSG (36,05±4,68)>15MMSG (32,68±3,88)>10MMSG (31,96±5,11)> NMSG (31,91±4,96), from best to worst. When squat jump performances of the protocols were compared with each other, there was no statistically significant difference in any of them (p> .05). Pairwise comparison, the best flexibility performance after the 5MMSG (35,16±6,33) protocol was determined as 10MMSG (33,81±6,08), 15MMSG (31,90±5,87), NMSG (28,70±5,63), respectively. When the protocols were analyzed within themselves, a statistically significant difference was found between NMMSG -5MMSG, NMSG-10MMSG, NMSG-15MMSG (p< .05). There is a significant difference only between 5MMSG and 15MMSG in counter movement jump performances (p< .05).

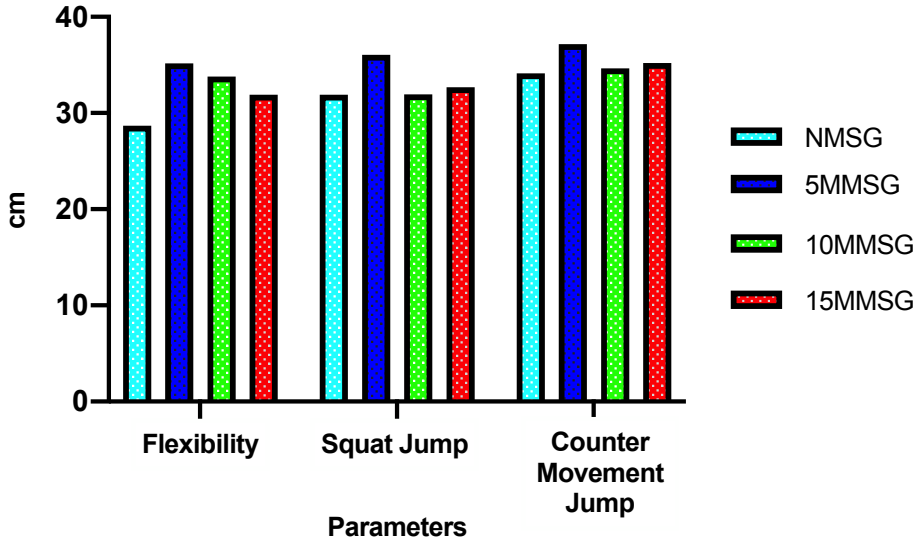

Figure 2. Flexibility, squat jump and counter movement jump performance of different massage durations

Discussion

Coaches and sports scientists work to provide warm-up and performance improvement before exercise or competition. It is thought that especially massage protocols applied before exercise or competition improve the physiological, biomechanical and psychological performance of the athletes by increasing their body temperature and range of motion. However, the optimal massage duration has not yet been determined in order to improve performance in applied massage protocols. It is important to determine the most appropriate massage duration, especially in short-term sports such as muay thai. Studies examining the effects of massage studies that provide performance improvement before exercise or competition may add originality to the literature for muay thai athletes. The aim of the study is to evaluate the effects of the most effective massage duration on flexibility, squat jump and counter movement jump performance among the different massage durations applied to muay thai athletes. It was determined that different massage durations could produce positive results on flexibility, squat jump and counter performance.

As a result of the study, it was determined that the most effective massage duration was 5MMSG. It was observed that 5MMSG had a significant increase in squat jump performance compared to the control group. When 10MMSG and 15MMSG were compared with the control group, it was observed that there was an increase in flexibility, squat jump and counter movement jump performance, while there were no significant differences between the averages of 10MMSG and 15MMSG values.

The results of the research are similar to the studies examining the effect of massage before exercise or competition. Studies have reported that massage stimulates the nervous system in the muscle tissue, increasing muscle elasticity and thus performance [37, 38]. Sykaras et al., [39] examined the effect of 2-minute massage (e.g. effusion, petrissage, friction, tapotement, pinching and squeezing) on knee extensor peak torque after concentric/eccentric contractions in Taekwondo athletes. As a result, it was observed that the massaged limbs performed better after intense exercise. Brooks et al., [40] reported that five minutes of manual forearm massage (including effusion and friction massage) showed significantly greater strength improvement in grip performance after 3 minutes of maximum exercise. The result of this study is similar to the results of some parameters measured in our study. Farr et al., [41] investigated the effects of massage including effusion and petrissage on muscle strength after 40 minutes of downhill walking on a treadmill in eight male participants and found that 40 minutes of downhill walking followed by 30 minutes of massage was associated with a significant benefit in strength gain.

Kargarfard et al., [42] found that 30 minutes of massage (including euphleurage, petrissage, and vibration) had positive effects on vertical jump performance in their study involving 30 male bodybuilders. Huang et al., [43] examined the effect of massage on the ROM of the hamstring muscle-tendinous junction and randomized ten active female participants to either 30-second massage, 10-second friction massage, or passive rest. As a result of the study, it was reported that there were significant increases in hip flexion ROM with 30 seconds of massage at the musculotendinous junction of the distal part of the hamstrings. However, they stated that there was no difference in passive leg tension or EMG findings. Arabaci [44] found that 10 minutes of back and 5 minutes of anterior lower extremity Swedish massage had a positive effect on sit and lie test results. This study is similar to our study in terms of reporting the positive effect of massage on flexibility performance.

It has been determined that there are studies stating that massage does not have a positive effect on strength and flexibility. For example, Hemmings et al. [45] found that massage had no positive effect on boxing power performance. Dawson et al., [46] examined the effect of repeated massage on strength gain after a half marathon and reported that massage had no effect on the rate of return to initial strength. Similarly, Dawson et al. [47] found in their study on runners that there was no significant difference between the groups in the strength indices of the athletes after the massage. Zainuddin et al., [48] stated that after eccentric elbow flexor exercise, 10-minute massage including effusion, petrissage and friction massage did not significantly improve muscle strength. In addition, studies have shown that massage does not have a positive effect on jumping performance [49, 50].

Conclusions

According to the results of this study, 5MMSG, 10MMSG and 15MMSG massage protocols provide positive effects on flexibility, squat jump and counter movement jump performances. It is thought that determining the most effective massage durations will save the athletes' time before the competition. As a limitation, this study did not include measurement tools that could directly identify the neurophysiological mechanisms implicated in enhancing physical performance of different massage durations, and only male muay thai athletes participated in this study. Studies that will determine the effects of different types of sports on different sports performance parameters in different massage types and massage durations to be made in the future will make significant contributions to sport performance.

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Conflict of interest

The authors report no conflict of interest.

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