

Science, Movement and Health, Vol. XVIII, ISSUE 2, 2018

June 2018, 18 (2): 160 - 165

Original article

THE EFFECT OF MASSAGE AND KINESIOTAPE APPLICATIONS ON MAXIMAL SQUAT STRENGTH

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Abstract*

Objective. This study was designed to assess the possible relationship between maximal squat strength with maximal squat strength after massage and maximal squat strength after kinesiotape.

Method of research. Thirteen college students (13 males, age=21.85±1.73 years, height=1.75±0.09 m, body weight=71.54±8.15 kg, 1RM=98.41±21.94 kg, 1RM after massage=103.09±22.71 kg, and after kinesiotape=104.64±25.32 kg) volunteered to participate in this study. Subjects were given up to 4 maximal attempts to achieve a 1RM. Suitable rests were allowed between trials (3–5 minutes). 1RM squat measurements were taken on three separate days throughout a week (first day=1RM squat, second day=1RM squat after massage, third day=1RM squat after kinesiotape application). 1RM squat after massage and kinesiotape were measured and Pearson product correlation coefficients and linear regression calculated between selected variables.

Results. We found a significantly relationship between 1RM squat and 1RM squat after massage. Also, there was a significantly relationship between 1RM squat and 1 RM squat after kinesiotape application. 1RM squat after massage in a unit change affects 1RM squat in 0.96 rate (P<0.05). On the other hand, 1RM squat after kinesiotape in a unit change affects 1RM squat in 0.79 rate (P<0.05).

Conclusion. Massage and kinesiotape application improved 1RM squat strength. It is considered that massage improved better than kinesiotape application.

Key words : Massage, kinesiotape, maximal squat strength.

Introduction

Motor skills which are power, strength, and speed are important for athletes. They can be argued that success in many and likely in most, sports depends upon attainment of some threshold level for maximum strength, power, and speed (Newton and Kramer, 1994; Hakkinen et al. 1996). The one repetition maximum (1RM) assessment is a well-established, valid, and reliable method of determining maximal strength. Power is, in turn, heavily dependent on maximal strength, with an increase in the latter being connected with an improvement in relative strength and therefore with improvement in power abilities (Bührle and Schmidbleicher 1977; Wisløff et al. 2004). The short-term application of maximal strength is

important for performance in consecutive weight competitive as weightlifting. Within this, the athletes are getting massage and different applications in a short time as break in. Also, pre-competition massage is often used to create a physiological and psychological sense of readiness for athletes. Effects of pre-competition massage include the delivery of oxygenated blood to the target musculature and hyperemia (Tessier 2005). Myofascial massage and kinesio taping have been suggested to increase blood flow, and are becoming increasingly popular (Ajimsha et al. 2014; Kase 1997). Kinesio taping is a special method of taping that ensures the support and stability of muscles and joints without affecting the body's own natural healing process-based joint movement. Also,

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Received 21 March 2018 / Accepted 6 May 2018

* the abstract was published in the 18th I.S.C. "Perspectives in Physical Education and Sport" - Ovidius University of Constanta, May 17-19, 2018, Romania

Kinesio Taping is currently regarded by physiotherapists as a method supporting rehabilitation and modulating some physiological processes (Słupik et al. 2007). As effect of Kinesio taping, increasing proprioception, correcting muscle function by strengthening weakened muscles, improving circulation of blood and lymph by eliminating tissue fluid or bleeding beneath the skin by moving the muscle, correcting muscle functioning by strengthening muscle weakness, and decreasing pain through neurological suppression (Kase et al. 2003). Therefore, this study was designed to assess the possible relationship between maximal squat strength with maximal squat strength after massage and maximal squat strength after kinesiotape.

Method

Experimental Approach to the Problem

This study was designed to assess the possible relationship between maximal squat strength with maximal squat strength after massage and maximal squat strength after kinesiotape. Maximal strength of the lower-body musculature is required for maximal ground reaction forces that have been associated with maximal movement velocities. Also, massage and kinesiotape is important for produce strength during short time. Thus, a 1RM squat after massage and kinesiotape were measured and Pearson product correlation coefficients and linear regression calculated between selected variables.

Subjects

Thirteen college students (age = 21.85 ± 1.73 years, height = 1.75 ± 0.09 m, body weight = 71.54 ± 8.15 kg, 1RM = 98.41 ± 21.94 kg, 1RM after massage =

103.09 ± 22.71 kg, and after kinesiotape = 104.64 ± 25.32 kg) participated in this investigation. All subjects voluntarily read and signed an informed consent, which was approved by the local ethic committee of Selcuk University.

Maximal Squat Strength Testing

Back squat 1RM was assessed after an appropriate warm-up protocol (8). The warm-up protocol consisted of multiple repetitions at loads equal to 30% (8–10 repetitions), 50% (4–6 repetitions), 70% (2–4 repetitions), and 90% (1 repetition) of the subject's estimated 1RM. During all attempts, subjects were required to lower the bar to a point where a 70° knee angle was attained. Before the start of the warm-up, a goniometer was used to visually demonstrate the attainment of a 70° knee angle while the subject was squatting. Subjects were given up to 4 maximal attempts to achieve a 1RM. Suitable rests were allowed between trials (3–5 minutes).

Masajsonrası, kinesiotapesonrası 1 maksimaltekrarlarınhesaplandığıgirecek.

Statistical Analyses

Statistical analysis was performed using SPSS IBM software (version 22.0, SPSS, Inc., IL.). According to the normality test results; Pearson correlation analysis was used to explain the relationship between the measurements. Linear regression analysis was utilized to determine the effects of massage and kinesiotape on 1RM strength performance. Significant level was taken as 0.05.

RESULTS

Table 1. Description for athletes (Mean \pm SD)

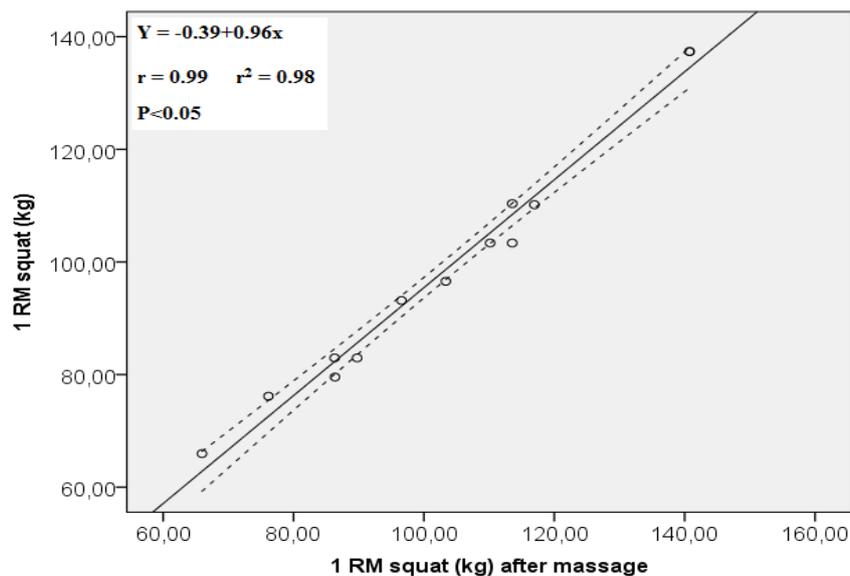
Variables	N	Mean	Std. Deviation
Age (years)	13	21.85	1.73
Height (m)	13	1.75	0.09
Weight (kg)	13	71.54	8.15
1 RM squat (kg)	13	98.41	21.94
1 RM after massage (kg)	13	103.09	22.71
1 RM after kinesiotape (kg)	13	104.64	25.32

The mean (SD) age was 21.85 ± 1.73 years, height was 1.75 ± 0.09 m, and weight was 71.54 ± 8.15 kg for the 13 physical education students.

Table 2. 1RM squat for athletes (Mean \pm SD)

Variables	N	Mean	Std. Deviation
1 RM squat (kg)	13	98.41	21.94
1 RM after massage (kg)	13	103.09	22.71
1 RM after kinesiotape (kg)	13	104.64	25.32

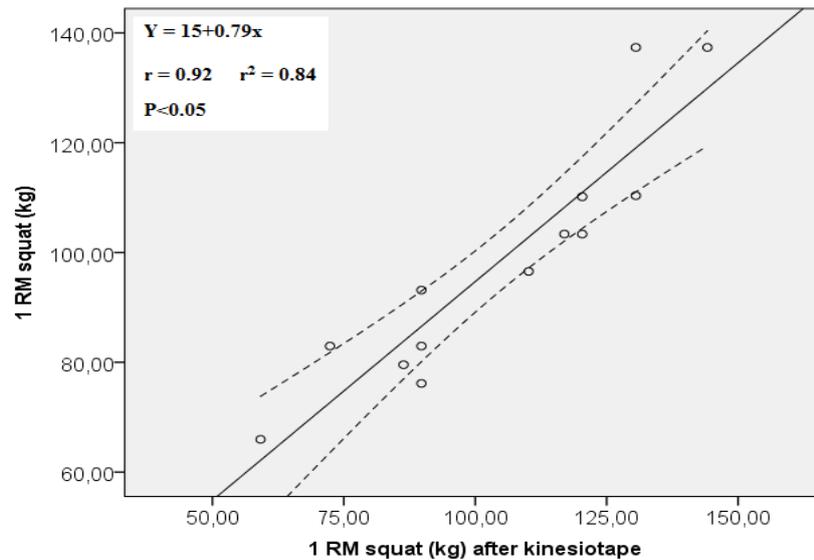
The mean (SD) 1 RM squat was 98.41 ± 21.94 kg, and 1 RM after massage was 103.09 ± 22.71 kg, 1 RM after kinesiotape was 104.64 ± 25.32 kg for the 13 physical education students.



Graphic 1. Regression analysis between 1 RM squat and 1 RM squat after massage

As shown Graphic 1 for 1RM squat and 1 RM squat after massage; regression model is significant ($p < 0.05$.) There is a significantly relationship between 1RM squat and 1 RM squat after massage. Also, regression analysis revealed

that 1RM squat after massage was a significant predictor of 1 RM squat, explaining 98% of the variance. 1RM squat after massage in a unit change affects 1RM squat in 0.96 rate ($P < 0.05$).



Graphic 2. Regression analysis between 1 RM squat and 1 RM squat after kinesiotape

As shown Graphic 2 for 1RM squat and 1 RM squat after kinesiotape; regression model is significant ($p < 0.05$.) There is a significantly relationship between 1RM squat and 1 RM squat after kinesiotape. Also, regression analysis revealed

that 1RM squat after kinesiotape was a significant predictor of 1 RM squat, explaining 84% of the variance. 1RM squat after kinesiotape in a unit change affects 1RM squat in 0.79 rate ($P < 0.05$).

DISCUSSION

In this study, the differential increase after massage and kinesio tape occurred in 1RM squat. However, statistically significant correlations were observed between 1RM squat with 1RM squat after massage and 1RM squat after kinesio tape. Also, regression analysis revealed that 1RM squat after massage and kinesio tape was a significant predictor of 1RM squat (explaining 98%; 84% of the variance, respectively) ($P < 0.05$). According to Slupik et al. (2007) reported, an examination performed 24 hours after the placement of the Kinesio Tape revealed significantly increased recruitment of the muscle's motor units, as expressed by peak torque. An examination performed after 72 hours of kinesio taping showed a statistically significant increase in bioelectrical activity of the muscle. However, this was lower than the effect at 24 hours. In the group where the

tapes were removed after 24 hours, high torque was still maintained. As reported in previous a study, a strong correlation was between maximal strength, sprinting, and jumping performance in elite soccer players. The soccer players with a high level of strength had used a training regimen with few repetitions, high loads, and emphasis on maximal mobilisation of force in the concentric part of the half squat. High squat strength did not imply reduced maximal oxygen consumption (Wisløff et al. 2004). Ozmen et al. (2016) examined squat exercise reduced flexibility and increased pain and sprint time compared with baseline. Kinesio Tape application resulted in similar sprint time and muscle pain as the no- Kinesio Tape condition but maintained flexibility compared with baseline. In a previous study, kinesiotape application brought about a significant increase in hop distance ($p = 0.015$, $P = 0.018$) in both the dominant and non-

dominant extremity and in isokinetic knee extension peak torque ($p = 0.034$) at $180^\circ /s$ (Aktas and Baltaci 2011). In a study, fourteen healthy young athletes (seven males and seven females) free of knee problems were enrolled. Muscle strength of the subject was assessed by the isokinetic dynamometer under three conditions: first; without taping; second; immediately after taping; third; 12 hours after taping with the tape remaining in situ. The result revealed no significant difference in muscle power among the three conditions. Kinesio taping on the anterior thigh neither decreased nor increased muscle strength in healthy non-injured young athletes (Fu et al 2008). Wiktorsson-Moller et al. (1983) examined that the effects of general warming up, massage, and stretching on ranges of motion and strength of quadriceps and hamstring muscles. Stretching resulted in a significantly increased range of hip flexion/ extension, hip abduction, knee flexion, and ankle dorsiflexion; the effect was significantly greater than that obtained by massage and warming up separately or combined. Only ankle dorsiflexion was influenced by massage or warming up, whereas stretching affected all muscle groups tested. Rinder et al (1995) reported that massage after exercise fatigue significantly improved quadriceps performance compared to rest ($p = 0.001$). Same study, there was a significant decrease in the mean number of leg extensions achieved by the subjects after fatigue followed by 6 min of rest ($p=0.001$) but there was no significant decrease in the number of leg extensions when 6 min of massage followed fatigue ($p = 0.167$).

Acknowledgments

Thank you to all of subjects who participated in this study.

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