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## ORIGINAL RESEARCH

### Kinesio Taping effects with different directions and tensions on strength and range of movement of the knee: a randomized controlled trial

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#### KEYWORDS

Physical therapy;  
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#### Abstract

**Objective:** To evaluate the Kinesio Taping effects with different directions and tensions on the strength of rectus femoris and range of movement of the knee in healthy individuals, but with a muscle imbalance caused by exposure to a continuous vibration.

**Methods:** This is a randomized controlled trial. The subjects were randomly allocated into two groups: Group application of the Kinesio Taping using origin to insertion and Group application of the Kinesio Taping using insertion to origin. In both groups the dominant limb received the application of Kinesio Taping on rectus femoris (experimental limb) while the non-dominant limb was used as control of the study (control limb). Three assessments were carried out with each subject at different time-points (baseline, post-application, 24 h later). These evaluations were performed with 0%, 10% and 75% of tension. The continuous vibration was conducted on the patella tendon for 20 min before the first evaluation on each subject. A handheld dynamometer and a digital goniometer were used to evaluate the strength of the rectus femoris and the range of movement of the knee.

**Results:** The sample consisted of 42 subjects, 79% women and 21% men, mean age 20.5 (SD = 4.6), body mass index average of 18.7 (SD = 2.34). There were no between-group differences for all outcomes.

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**Conclusion** This study suggests that the use of Kinesio Taping in healthy individuals did not change muscle strength or increase range of movement. Future clinical trials are recommended for symptomatic patients.

Trial registration: NCT02501915 (<https://clinicaltrials.gov/ct2/show/NCT02501915>).  
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## Introduction

Kinesio Taping (KT) is a technique developed in Japan by Kenzo Kase in 1976, which uses a specific methodology with an elastic tape, the Kinesio Tex Tape (KTT). KTT is composed of a material that differs from other tapes since it presents unique qualities (elasticity, adherence, mechanical, texture and recoil) which may promote an increase of the somatosensory stimulation and consequently mechanoreceptors and proprioceptive input, enabling responses to inhibition, activation, muscle facilitation, in addition to many other mechanical effects.<sup>1-4</sup>

According to the recent literature, there are many studies relating to KT, muscle strength and ROM. In one recent systematic review and meta-analysis about Kinesio Taping and muscle strength, the authors concludes that Kinesio Taping does not increase muscle strength in healthy individuals and probably the effects are not dependent on muscle for the taping.<sup>5</sup>

There are some studies with healthy individuals, that found positive results such as reduced time to reach the peak torque,<sup>6,7</sup> reduced movement time excursion on dorsiflexion<sup>8</sup> and increased peak torque on the gastrocnemius.<sup>9</sup> On the other hand, there are also some recent studies that did not find any positive results.<sup>10-12</sup>

According to the method, the increase of muscle strength occurs when it is applied with the facilitation technique (application from the muscle origin to its insertion with tension between 15% and 35%). The application in favor of muscle contraction improves neural communication with the mechanoreceptors, increasing the number of motor units recruited. The inhibition technique (application from insertion to the muscle origin) promotes an inhibition of the motoneurons with consequent relaxation of the muscles and does not promote increases of muscle function.<sup>1</sup> However, in relation to the presence of facilitation and inhibition, a study with healthy subjects did not find any difference on those applications. This study used a different way to tape, using the antagonist, but they evaluated the agonist effect.<sup>13</sup>

Regarding range of movement (ROM), many studies have been conducted with KT. Therefore, most of them attempt to identify the increase of ROM through the reduction of pain on some specific injury.<sup>4,14,15</sup> While other studies, have also researched the increased ROM in healthy subjects and in normal conditions.<sup>3,8,9,16,17</sup>

Considering that most of the studies evaluated the effects of KT on muscle strength and ROM in healthy subjects, few studies have evaluated the hypothesis of

facilitation and inhibition proposed by the KT method, and there are also few studies that evaluated the effects of KT according to the different tensions. Therefore, this study aims to evaluate the Kinesio Taping effects with different directions and tensions on the strength of rectus femoral and the ROM of the knee on healthy individuals, but with a muscle imbalance caused by exposure to a continuous vibration before the tape.

## Methods

This is a randomized controlled trial, in which the principal investigator who assessed the outcomes and the subjects were masked to the allocation of intervention.

The study was conducted in a Biomechanics laboratory located in a private institution in the city of Goiania, Brazil, was approved by the Ethics Committee of the Universidade Salgado Oliveira (UNIVERSO), Goiânia, Goiás, Brazil with the number 561.500, according to the Resolution of the Ministry of Health 466/12, and the subjects gave informed consent. This trial was prospectively registered at ClinicalTrials.gov (NCT02501915).

The inclusion criteria were: subjects of both genders, any race, ages between 18 and 40 years, healthy, with no musculoskeletal disorders, and no history of injury in the last six months in the lower limbs. The exclusion criteria were: subjects with body mass index greater than 24.99, with musculoskeletal disorders and related pain, history of tape allergy or skin sensitivity, any condition counter indicating physical activity, nerve root compromise, cardio respiratory conditions, pregnancy or previous knowledge of KT. All the subjects were asked to not exercise between the evaluations.

The sample of this study was determined based on a sample size calculation carried out in a pilot study with six individuals, to identify the correlation between the ratio found in KT applications for the different mean values found in the evaluations of the same. In this way, the Pearson Linear Correlation Coefficient  $r=0.5$  was used, considering a level of significance of  $\alpha=5\%$ , also with 80% of statistical power.

The participants were randomly allocated into two groups: Group KTT application from the muscle origin to its insertion, and Group KTT application from insertion to origin as shown in the diagram (Fig. 1). The dominant limb received the KTT application and the non-dominant limb was the control of the study on both groups. The study participants' recruitment period was from February of 2014 to

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