

## ARTÍCULO

### Immediate effect of Kinesio Tape on maximal muscle strength in vertical jump performance on healthy martial artists

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## Abstract

**Objective:** to analyze the immediate effect of kinesio tape (KT) in vertical jump performance, applied from insertion to origin on the quadriceps muscle group.

**Methods:** 14 martial artists (11 males and 3 females), All the participants jumped without KT and then jumped with KT, in both situations, they jumped three times and the best jump was saved for analysis. The selected jump test was Squat Jump, following the BOSCO Protocol, using the Axon Jump© platform model S.

**Results:** The variables were time of flight (TF), height (H) and speed (S), they were measured by the Axon Jump© platform and the data was analyzed using SPSS 19© software. The best jump for all situations was analyzed on a T test, showing that all, but three subjects, had a decrease jump performance using KT.

**Conclusion:** our results suggest that the application of KT can have an immediate effect on vertical jump performance, in

applied from insertion to origin of the muscles.

**Keywords:** Kinesio tape, K tape, Squat jump, Muscle performance.

## Introduction

Muscle power is characterized by the relationship between concentric muscle contraction and speed contraction, therefore, maximum muscle power can be obtaining at a certain level of maximal force and speed. The association between muscle power and kinesiotape has been well known by physiotherapists worldwide in muscle injures, but there is not enough research on how associates in healthy athletes and their performance.<sup>1, 2</sup>

Kinesiotape (KT) is a bandaging technique, created by kenso kase, it's very thin and can be stretched up to 40% of its original length. KT have several effects, normalize muscle function, increase vascular flow, reduce pain, joint

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alignment correction and stimulates skin mechanoreceptors improving proprioception. However, its effects on muscle power remain inconclusive.<sup>3 6</sup>

The objective of this study was to analyze the effects of KT relaxation technique in healthy martial artists, comparing the results of muscle power in a squat jump without tape in comparison with KT in both quadriceps muscles. We hypothesized that the KT would have a positive effect in the muscle power for the quadriceps muscle.

## Methods

### Participants

This study recruited 14 martial artists (11 males and 3 females). Inclusion criteria were as follows: (1) they practice a martial art for at least 1 year, (2) six months without any injury, (3) agreed to participate in the study. Exclusion criteria were as follows: (1) any contraindication to KT technique, (2) age 13 or younger, (3) back pain.

### Design

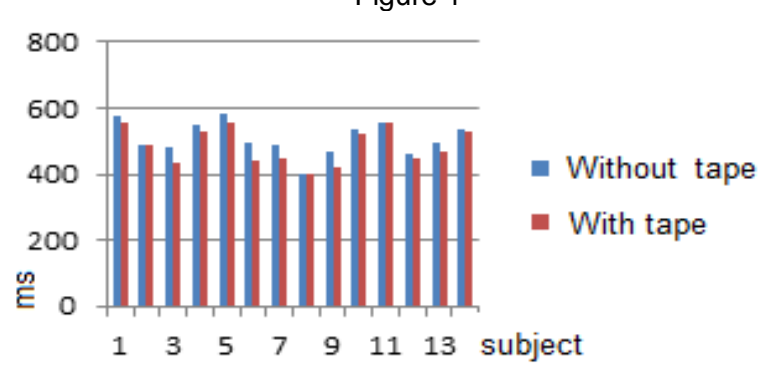
All the participants jumped without KT and then jumped with KT, in both situations, they jumped three times and the best jump was saved for analysis. Written informed consent was obtained from all participants in the study. Before the tests all participants were briefed about the study, after that the area of

application of the KT (quadriceps femoris muscle) was prepared (no hair and cleaned with alcohol), then they were asked to do their normal warm up routine. Before they do the squat jump, it was explained and showed, so they knew how to do a proper squat jump. For the test, all subjects did three jumps without KT and the average was considered for the comparison. For the KT jump a Y shape tape was applied on the quadriceps femoris muscle, from the tibial tuberosity to the anterior inferior iliac spine, and they did three squat jumps with the KT. All jumps followed the BOSCO protocol<sup>7,8</sup> using the Axon Jump© platform model S, a certified operator use the Axon Jump© platform and a certified physiotherapist applied the KT.

## Results

The variables of the study were time of flight (TF), height (H) and speed (S), they were measured by the Axon Jump© platform and the data was analyzed using SPSS 19© software, using a T test comparing the average of each set of jump (with and without KT) for each subject. TF (Fig.1) the average for all subjects was 508.14 milliseconds (ms) without KT and 405.5 ms with KT, the highest record was 583 ms without KT and 559 ms with KT and the lowest was 399 ms for both conditions, the analysis within each subject showed an alfa of 0.001.

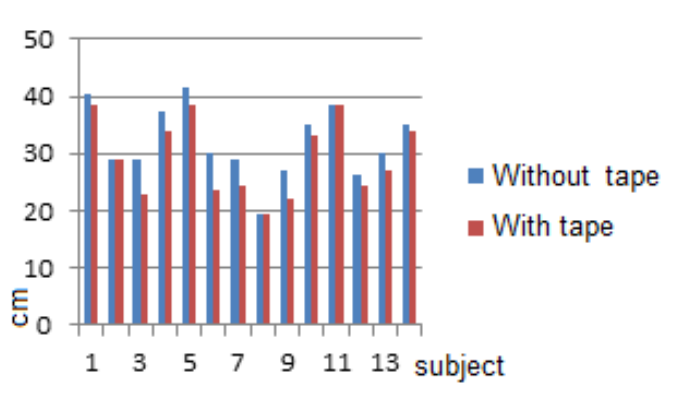
Figure 1



H (Fig.2) the average for all subjects was 32.02 centimeters (cm) without KT and 29.23 cm with KT, the highest record was 41.7 cm without KT and 38.3 cm with KT

and the lowest was 19.6 cm for both conditions, the analysis within each subject showed an alfa of 0.000.

Figure 2

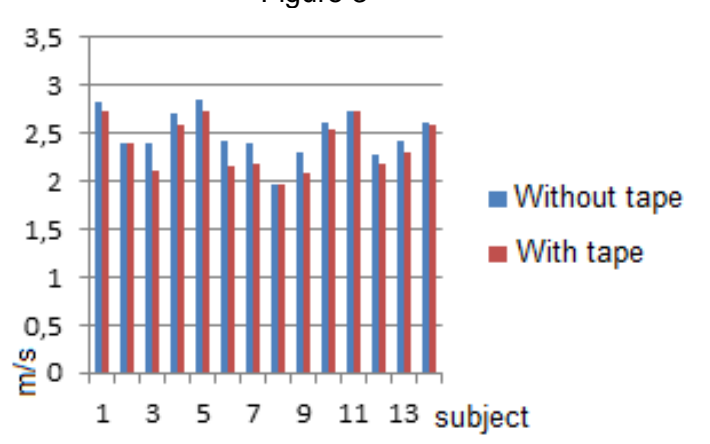


S (Fig.3) the average for all subjects was 2.5 meters per second (m/s) without KT and 2.38 with KT, the highest record was 2.86 m/s without KT and 2.74 m/s with KT and the lowest was 1.96 m/s for both

conditions, the analysis within each subject showed an alfa of 0.001.

It must be noticed that 3 subjects did not change at all in both conditions.

Figure 3



## Discussion

The results showed that KT may partially inhibits the quadriceps femoris muscle in all subjects (except three subjects), when applied from insertion to origin. This phenomenon could be related to proprioceptive stimuli due to skin traction.

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These findings may be partially explained as skin traction with the KT may affect the fascia and the muscle spindle receptors, allowing them to partially inhibit the quadriceps femoris muscle.

Proprioception is close related to joints positioning and movement as McCloskey said in 1978<sup>9</sup>, this ability of the body is

linked to the central nervous system, the skin, fascia, muscles, joints and tendons.  
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KT modifies skin length, due to its traction force, generating some stimuli in the skin receptors and they can have a significant role in our proprioceptive capacity<sup>3, 10</sup>, and in this study it could send signals to the central nervous system, making it to believe that there is a change in muscle length and its response is to inhibits muscle strength in order to stop it.

There is also the role of the muscle fascia, it can transmit muscle force that can alter body posture and it can contract like smooth muscle altering the body biomechanics<sup>11</sup> therefore KT can generate traction forces on the skin that can influence the fascia, in this case quadriceps fascia, generating an inhibiton signal to the muscles on the area of KT application.

According to Kenso Kase, KT can strength muscles, but is not totally confirmed<sup>9</sup> maybe due to the lack of methodology of KT application protocols. We suggest that in this study the stretching force that affect the quadriceps muscle group was so intense that generated a global relaxation on the leg's muscles decreasing the jump performance on the subjects.

Muscle spindle can sense in two ways muscle length, with or without considering the speed of change in

muscle length<sup>12</sup> and can modify the alfa motor neuron excitability.<sup>13</sup> Therefore, KT might somehow modify muscle spindle stimulation, affecting the excitatory state of the alfa motor neurons of the quadriceps muscle group, resulting in a lower activation of these muscle during the jump.

Limitations on this study were related on the number of subjects and probably three of them were too young or unexperienced for this kind of measurements, maybe with a larger sample results could be clearer on the effect of K tape. But Its shows that there is a need for more studies related with the use of K tape on healthy athletes, the findings in this study suggests that it may have an effect that could decrease performance, something that should not pass unnoticed.

## Conclusion

KT is a wide known and used tool for physiotherapists, but there are a lot of misunderstandings on how it works, especially when used with athletes hoping to improve performance.<sup>1, 2</sup> This study shows that the relaxation protocol (from insertion to origin of the quadriceps muscle group) might decrease muscle performance. Probably by a connection to skin receptors, fascia, muscle spindle or an interaction between them.

Future studies on KT application will be needed to show the true potential of this powerful physiotherapy tool.

Table 1, Height (H)

Subject	Control (without KT)	Intervention (KT)
1	40,5	38,3
2	29,1	29,1
3	29,1	22,7

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4	37,2	34,0
5	41,7	38,3
6	30,1	23,6
7	29,1	24,5
8	19,6	19,6
9	27,2	22,0
10	35,0	33,1
11	38,3	38,3
12	26,3	24,5
13	30,1	27,2
14	35,0	34,0

**Table 2, Time of Flight (TF)**

<b>Subject</b>	<b>Control (without KT)</b>	<b>Intervention (KT)</b>
1	575	559
2	487	487
3	479	431
4	551	527
5	583	559
6	495	439
7	487	447
8	399	399
9	471	423
10	535	519
11	559	559
12	463	447

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13	495	471
14	535	527

Table 3, Speed (S)

Subject	Control (without KT)	Intervention (KT)
1	2,82	2,74
2	2,39	2,39
3	2,39	2,11
4	2,70	2,58
5	2,86	2,74
6	2,43	2,15
7	2,39	2,19
8	1,96	1,96
9	2,31	2,08
10	2,62	2,55
11	2,74	2,74
12	2,27	2,19
13	2,43	2,31
14	2,62	2,58

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