

Immediate Effect of Kinesio Taping on Muscle Response in Young Elite Soccer Players

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Context: Kinesio taping (KT) is a new taping technique increasingly used in sports medicine to improve muscle performance; however, its real effect is not entirely known. **Objective:** To assess the immediate effects of KT on muscle performance in young healthy elite soccer players. **Design:** Crossover study. **Setting:** University laboratory. **Participants:** Eighteen young elite soccer players voluntarily participated in the study (mean \pm SEM: age 18.20 ± 2.45 y, height 1.76 ± 3.56 m, body mass 65.25 ± 3.76 kg, body-mass index 20.12 ± 1.25 kg/m²). **Interventions:** Each subject completed 2 different protocols, with and without KT. Interventions were performed in a random order, with a washout period between conditions of 1 wk. **Main Outcome Measures:** Outcome measures included tensiomyographic response in the vastus lateralis and vastus medialis, power output with 30 and 50 kg, countermovement jump, and 10-m sprint. **Results:** Data showed no significant differences for any of the outcomes analyzed between interventions. **Conclusions:** KT does not produce a short-term improvement in muscle performance in young elite soccer players.

Keywords: tensiomyography, muscle performance, leg-extension muscles

It has been demonstrated that elite soccer players not only require sport-specific technical and tactical skills, but explosive strength and speed are also essential for optimal performance.^{1,2} Consequently, in recent years there has been a heightened focus on designing and implementing training methods and techniques to improve these aspects of athletic performance. In the field of sports medicine, the application of different types of tape has been used for many years to prevent injury, but more recently taping techniques are being used to increase muscle performance. The proposed physiological basis of traditional tape and taping techniques was that taping the skin would stimulate cutaneous mechanoreceptors and therefore enhance the delivery of sensory input from the periphery to the central nervous system. This increased sensory input would then result in greater information integration and a significant improvement in proprioception and muscle performance.³⁻⁸ However, it should be taken into account that joint movement might be limited.^{9,10}

In recent years, the use of a new form of cotton tape with acrylic adhesive, known as kinesio tape (KT), has proliferated. This tape differs from traditional tape due to its elasticity—it can be stretched to up to 120% to 140% of its original length before being applied to the skin.¹¹ Another difference from traditional tape is that KT can provide a pulling force to the skin and supposedly

increase the distance between the fascia and the soft tissue under the areas where it is applied.¹² In addition, KT does not restrict joint movement in the same way that traditional taping does and can be worn for longer periods of time without the need for reapplication.^{13,14}

It is also argued that KT can be used not only to increase muscle performance¹⁵ but also to normalize muscle function, to increase lymphatic and vascular flow, to diminish pain, and to aid in the correction of possible articular malalignments.^{13,16} While KT techniques are frequently applied to patients with musculoskeletal system disorders, especially in the field of sports injuries,¹⁷ most of the supposed effects are hypothesized, and there is no evidence in the literature supporting the effects of KT taping.

The real effects of KT on muscle performance are still being investigated; several authors have hypothesized that the KT facilitates immediate increases in muscle strength by producing a concentric pull on the fascia, which may then stimulate increased muscle contraction,¹⁸ or that KT improves muscle alignment, which may contribute to marginal increases in muscle strength.¹⁹ Slupik et al²⁰ demonstrated an increase in peak torque (24 h) and electromyographic activity (72 h) in the vastus medialis of healthy individuals after application of KT tape. Huang et al²¹ investigated the effect of elastic taping on the triceps surae during a maximal vertical jump. They observed that vertical ground-reaction force and electromyographic activity of the gastrocnemius medialis increased when KT was applied, although the height of jump remained constant. Hsu et al¹⁹ observed an incremental increase in lower trapezius muscle strength after a taping application. Lee et al²² showed greater grip

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muscle fibers the muscle tone might increase, and therefore it may facilitate the strength of the underlying muscle. However, in the current study all TMG parameters showed no significant effects when the KT was applied; it is therefore apparent that there is no clear relationship between increased muscle tone and KT.

When short-term effects of KT on muscle performance were analyzed, our results agree with those of Fu et al.²³ and Slupik et al.,²⁰ who did not find positive effects of KT on peak torque during isokinetic activations of the leg muscles immediately and after 10 minutes of taping, respectively. Hsu et al.¹⁹ investigated the effect of elastic taping on strength of the scapular muscles in baseball players with shoulder impingement. Compared with the placebo taping, the strength of the lower trapezius had a tendency to increase after KT application, but again this response was not statistically significant. However, Huang et al.²¹ showed increases in electromyographic activity and reaction force when KT was applied on the calf muscle, but jump height did not improve.

When they assessed the long-term effect of KT, Fu et al.²³ found no significant increase in muscle strength 12 h after application of the tape. However, Slupik et al.²⁰ showed that KT has a positive effect on muscle activity 24 and 72 hours (but not 96 h) after taping. Long-term effects were not analyzed in the current study, but it may be that KT's effects are more apparent 24 to 72 hours after its placement.

Several theories have tried to explain these contradictory results. Slupik et al.²⁰ suggested that effects of KT may be due to an increased recruitment of the muscle's motor units. However, Ridding et al.³⁷ and Simoneau et al.³⁸ hypothesize that tactile input has been reported to interact with motor control by altering the excitability of the central neuron system. Huang et al.²¹ indicate that the muscle that contributes the most during an activity may reflect larger electromyographic change with KT. In addition, Alexander et al.³⁹ reported that the longitudinal strip may shorten the muscle fibers, producing a decrease in the afferent Ia discharge from the neuromuscular spindle, causing a reduction in the motor neurons of the medullar anterior horn, proved by the diminished amplitude of the H reflex observed. According to Hsu et al.,¹⁹ the reason KT application could lead to the immediate marginal increase in muscle strength can be explained by the results of the facilitated muscle activity and improved joint alignment.

The negative results observed in the current study may be explained by the fact that afferent stimuli generated by KT may not be strong enough to modulate muscle performance of healthy soccer players. Another possible explanation for these results may be type of tape, as was suggested by Hsieh et al.⁴⁰ In addition, unlike most studies in the field, in this investigation functional muscle-performance tests were used, which may be less sensitive to change (but more clinical and functionally relevant), which could explain the differences found between our results and those of others. In addition, the functional tests

used higher loads, facilitating greater muscle-fiber recruitment and motor-unit synchronization, but these loads are less used in daily soccer-training routines.

Finally, our study had some limitations that should be considered. Tape localization and/or trajectories on the target limb, joint, or muscle and application technique used by the therapist can influence the effect of KT on muscle performance. In our study, a standard 2-in (5-cm) black KT was used, and an experienced physiotherapist applied it in all cases following the Y-shaped KT technique proposed by Kase et al.¹³ and Fu et al.²³ However, subtle differences in tape and application used across the studies may account for some of the differences.

Conclusions

In conclusion, there is no short-term effect of KT on contractile properties and muscle performance in young elite soccer players. However, new studies are needed to confirm long-term effects of KT 24 to 72 hours after taping.

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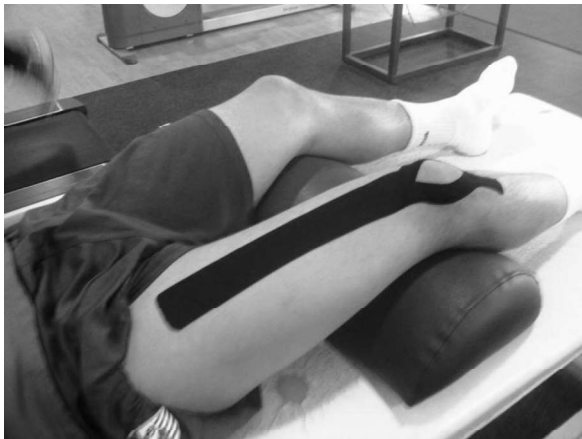


Figure 1 — The taping method and subject posture employed when applying Kinesio taping.

Kinesio Taping in Soccer Players

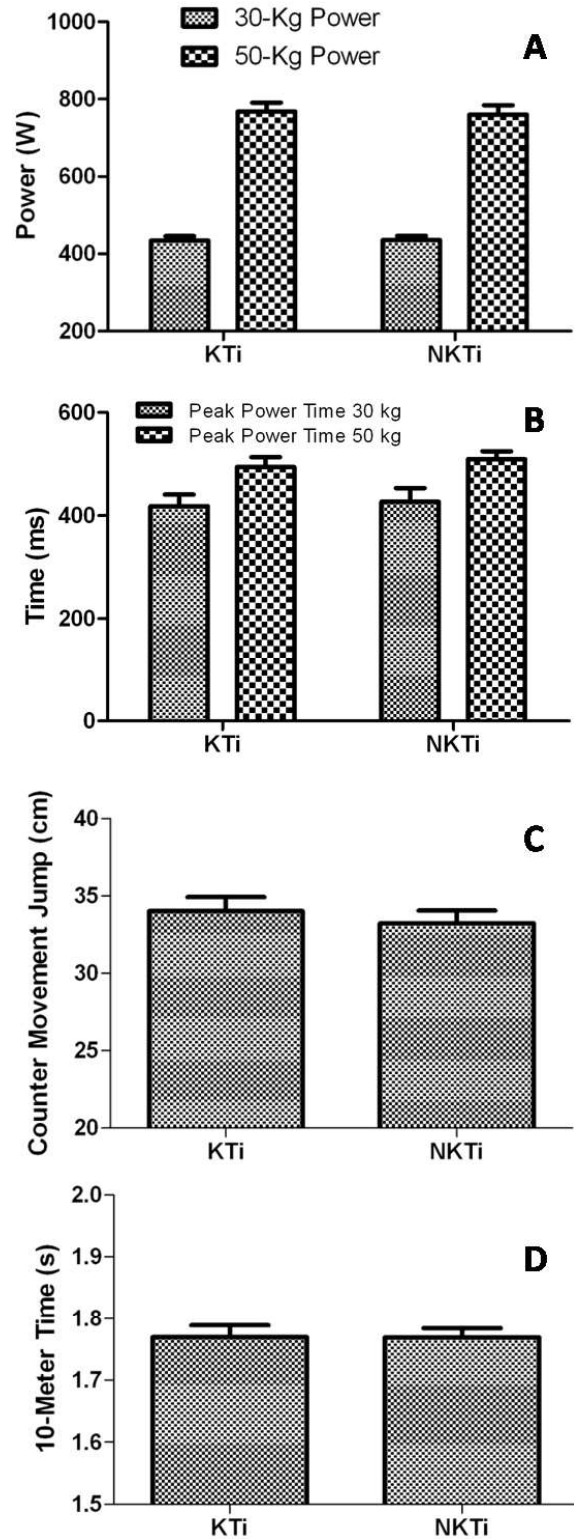


Figure 2 — Interprotocol comparison for (A) power output, (B) peak power time, (C) countermovement jump, and (D) 10-m time. Abbreviations: KTi, kinesio taping; NKTi, no kinesio taping.

Table 1 Tensiomyographic Measurements in Both Interventions

Muscle	Measure	Group		F	P
		Kinesio taping, mean \pm SEM	No kinesio taping, mean \pm SEM		
Vastus medialis	contraction time (ms)	24.48 \pm 0.67	24.88 \pm 0.75	0.560	.931
	substation time (ms)	185.38 \pm 9.99	181.53 \pm 11.09	0.498	.959
	relaxation time (ms)	79.46 \pm 10.83	70.55 \pm 13.58	0.210	.866
	maximum distance (mm)	5.20 \pm 0.28	5.82 \pm 0.38	0.928	.391
	delayed time (ms)	19.19 \pm 0.40	20.07 \pm 0.46	1.373	.277
Vastus lateralis	contraction time (ms)	20.81 \pm 0.45	20.87 \pm 0.98	0.169	.845
	substation time (ms)	78.24 \pm 9.91	81.93 \pm 11.39	0.054	.947
	relaxation time (ms)	54.47 \pm 9.31	53.99 \pm 9.47	0.021	.979
	maximum distance (mm)	4.09 \pm 0.32	3.71 \pm 0.35	0.456	.638
	delayed time (ms)	19.73 \pm 0.42	19.22 \pm 0.32	0.636	.536