



A Systematic Review of the Efficacy of Kinesiology Taping in Enhancing Range of Motion and Reducing Pain

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Abstract

Background: Kinesiology taping, or KT, is a popular therapeutic technique among clinicians worldwide for managing musculoskeletal pain and impairment. Despite the widespread application in sports medicine, physiotherapy, and rehabilitation, a clear consensus on its efficacy for the improvement of ROM and pain reduction has not yet been achieved due to conflicting results presented in the literature.

Aim: The aim of this systematic review is to critically appraise and synthesize current evidence from RCTs regarding KT's effectiveness in improving ROM and relieving pain among patients with various musculoskeletal conditions.

Methods: A systematic search of PubMed, Scopus, Web of Science, CINAHL, and PEDro databases was carried out for RCTs published between 2013 and 2024. The studies included in this review investigated the effects of KT on ROM and/or pain compared to sham taping, other interventions, or no intervention.

Results: KT is associated with a small, statistically significant short-term pain reduction in conditions such as shoulder impingement and low back pain, although the clinical relevance of these findings is often doubtful. The evidence on ROM is more conflicting, with some studies demonstrating small improvements in selected populations (for example, post-stroke and ankle sprains) while others have shown no benefit compared to sham tape or active modalities. A placebo effect would seem to be an important contributor to perceived benefits.

Conclusion: KT may be regarded, depending on the context, as a complementary modality for transient pain relief and gains in ROM. The magnitude of effect is usually small, and it may not be superior to other established interventions. Future high-quality research should focus on the standardization of application protocols, identification of optimal patient subgroups, and further elucidation of specific neurophysiological and biomechanical mechanisms of action.

Keywords: kinesiology taping, pain, range of motion, rehabilitation, musculoskeletal pain.

Introduction

Musculoskeletal pain and functional limitations, especially those related to restricted range of motion, are a global health burden, resulting in disabled states, a reduction in quality of life, and huge economic burdens (Vos et al., 2017). In pursuit of effective management strategies, numerous therapeutic modalities have been developed, among which Kinesiology Taping has become remarkably popular since its introduction by Dr. Kenzo Kase in the 1970s. Characterized by elastic properties allowing 130-140% longitudinal stretch and made of cotton with an acrylic adhesive, KT has been theoretically proposed to interface with the neurosensory, circulatory, and fascial systems (Kase, 2003). The putative mechanisms of action are multifactorial and

include: lifting the skin to create convolutions and thereby enhance interstitial fluid flow and lymphatic drainage; providing proprioceptive feedback that facilitates or inhibits muscle activity; correcting aberrant joint alignment; and modulating pain through the Gate Control Theory (Williams et al., 2012).

KT has been widely adopted by physiotherapists, athletic trainers, and other health professionals in the management of numerous conditions such as shoulder impingement, low back pain, ankle sprains, post-surgical edema, and neurological rehabilitation (Kalron & Bar-Sela, 2013). Its non-restrictive nature and the fact that it could be applied for up to 24 hours make it an attractive adjunct to conventional exercise and manual therapy. Despite its pervasive use and patient appeal, scientific

evidence supporting its efficacy is marked by inconsistency and controversy. While some RCTs and meta-analyses report positive effects on pain and ROM, others conclude minimal, non-significant benefits, or largely due to a placebo effect (Parreira et al., 2014; Montalvo et al., 2014).

The lack of consensus may be partly explained by heterogeneity in the populations studied, taping techniques used (e.g., facilitation versus inhibition), comparison groups employed (sham tape, no tape, other physiotherapy), outcome measures used, and the timing of assessment. The methodological quality of studies also varies significantly, further complicating any attempts to reach a definitive conclusion. Given these observations, the need exists for a systematic and critical synthesis of the latest and best evidence to inform clinical practice and future research directions.

The primary purpose of this systematic review is to evaluate the existing body of evidence from RCTs published between 2013 and 2024 on the effectiveness of KT, particularly in improving ROM and reducing pain among patients with musculoskeletal disorders. This review will attempt to answer the following questions:

1. Does KT result in clinically meaningful improvements in pain intensity compared with sham taping, no intervention, or other active treatments?
2. Does KT produce significant gains in active or passive ROM across different joints and pathologies?
3. What is the quality of the existing evidence, and what are the potential sources of bias?
4. What are the recommendations for clinical practice and future research based on the synthesized evidence?

Methodology

Search Strategy

A literature search was carried out using a comprehensive approach. The electronic databases PubMed, Scopus, Web of Science, CINAHL, and PEDro were searched from January 2013 to December 2024 for eligible studies. The strategy was built using a combination of MeSH terms and keywords about the intervention and outcome. Thus, the core string included: ("kinesiology tape" OR "kinesio tape" OR "kinesiotaping" OR "elastic therapeutic tape") AND ("pain" OR "range of motion" OR "flexibility" OR "disability") AND ("randomized controlled trial" OR "RCT"). The use of Boolean operators like AND and OR combined the terms, while search filters were applied to limit the results to studies on humans in the English language.

Inclusion and Exclusion Criteria

The inclusion criteria for this systematic review were defined to capture studies that directly investigated the effect of Kinesiology Taping on pain and range of motion. To be included, studies needed to involve human participants who were either adults

aged 18 years or older with a diagnosed musculoskeletal condition-such as shoulder pain, low back pain, knee osteoarthritis, or ankle sprain-or healthy volunteers. The intervention of interest was the application of Kinesiology Tape, irrespective of the brand, used either as primary treatment or as an adjunct to other therapies. Eligible studies had to employ a comparison group, which could consist of sham taping made with non-elastic tape or KT applied without tension, a no-intervention control, a placebo, or another active intervention like physiotherapy or manual therapy. The main outcomes of interest were quantitative measures of pain intensity-assessed by tools like the Visual Analog Scale or Numeric Pain Rating Scale-and/or measures of range of motion obtained through goniometry or inclinometry. Only randomized controlled trials or clinical trials were considered for inclusion. On the other hand, studies were excluded if they were non-randomized, case reports, or reviews; if KT had been combined with another intervention in a manner that did not allow the specific effect of KT to be isolated; if pain or range of motion outcomes were not reported; or if they were not full-text articles available in English.

Data Synthesis

A meta-analysis was not appropriate due to significant clinical heterogeneity regarding the populations, interventions, comparison groups, and outcome measures. Therefore, a narrative synthesis was conducted. The findings were organized and presented by anatomical region (e.g., shoulder, knee, lumbar spine), which allowed for a structured analysis of the evidence.

Mechanisms of Action: Proposed Theory vs. Scientific Evidence

The theoretical bases of KT represent a cornerstone in its clinical application; nonetheless, they often run ahead of empirical evidence. The main proposed mechanisms can be classified into neurosensory, circulatory, and mechanical effects.

Neurosensory and Proprioceptive Effects

A leading hypothesis is that KT influences the neurosensory system. By stretching the skin and applying tension to the tape, it is proposed to stimulate cutaneous mechanoreceptors, Merkel discs, Meissner's corpuscles, and Ruffini endings. This afferent input is theorized to modulate pain perception via the Gate Control Theory, where nonnociceptive input can inhibit pain signal transmission in the dorsal horn of the spinal cord (Kase, 2003). More significantly, this sensory input is thought to enhance proprioception, or the body's sense of its position in space. For instance, a "facilitation" technique is one in which tape is applied from origin to insertion over a muscle thought to increase afferent feedback, with potential improvements in muscle activation and timing that can indirectly influence ROM and stability (Halseth et al., 2004; Russo et al., 2018). Conversely, an "inhibition" technique applied from insertion to origin is used for hypertonic muscles, aiming at

reducing excessive tone. However, these proprioceptive rationales are challenged by a failure to consistently demonstrate significant changes in muscle activity following KT application as tested using EMG (Lumbroso et al., 2014).

Circulatory and Lymphatic Effects

At the center of this theory of improved circulation is the distinctive skin convolutions or "folds" seen after the application of KT. The tape's recoil is said to elevate the skin from the underlying fascia, creating an interstitial space. It is hypothesized that this space would reduce the pressure on lymphatic vessels and capillaries, thus improving blood and lymph flow, reducing edema, and facilitating the removal of metabolic waste products (Kase, 2003). In support of these claims, several small studies have used bioimpedance or infrared thermography to demonstrate changes in blood flow or temperature, respectively, following KT application (Lee & An, 2021). Of course, robust evidence from studies of high quality is not present, and such subtle circulatory changes have uncertain clinical effects on pain and function, especially in conditions without edema; such benefits are likely minimal.

Mechanical and Fascial Effects

KT is also often used over specific tension to offer structural support and correction to alignment, such as patellofemoral pain syndrome or shoulder impingement. The theory is that the elastic properties of the tape can give a subtle corrective force onto joints and fascia, guiding movement and offloading stressed tissues (Thelen et al., 2008; Kamari & Kazemi, 2018). While the tape often creates a sensation of support, direct biomechanical studies have demonstrated that KT offers negligible mechanical support for rigid sports tape, particularly during dynamic activities (Parreira et al., 2014). Its influence is now considered neurosensory rather than biomechanical; thus, its role is more related to tactile cueing, potentially altering the movement pattern and not physically restraining the joints.

The Efficacy of Kinesiology Taping on Pain

The effect of KT on pain has been studied for a wide range of conditions. The evidence is summarized below by anatomical region and presented in Table 1 and Figure 1.

Table 1: Summary of Evidence for Kinesiology Taping on Pain by Anatomical Region

Anatomical Region	Condition	Key Findings from Included Studies	Overall Conclusion
Shoulder	Subacromial Impingement, Rotator Cuff Tendinopathy	Multiple RCTs report statistically significant short-term pain reduction (VAS/NPRS) compared to sham tape or no tape (Zaki et al., 2022; Shakeri et al., 2013). Effects often diminish over time and may not be superior to exercise therapy alone.	Moderate evidence for short-term relief. Likely a combination of minor physiological effects and a significant placebo response.
Knee	Patellofemoral Pain Syndrome (PFPS), Osteoarthritis (OA)	Mixed results. Some studies show modest pain reduction in PFPS and OA (Aytar et al., 2011; Mohamed & Alatawi, 2022), while others find no difference vs. sham tape (Rehman et al., 2020). Effects are typically small and short-lived.	Conflicting to weak evidence. May offer transient symptomatic relief in some individuals, but not a standalone treatment.
Lumbar Spine	Non-Specific Low Back Pain (LBP)	Several RCTs support a small to moderate reduction in pain intensity in acute and chronic LBP compared to sham taping or no intervention (Júnior et al., 2019; de Brito Macedo et al., 2019). Often used as an adjunct to core stabilization exercises.	Moderate evidence for short-term pain reduction. It can be a useful adjunct in a multimodal approach.
Ankle	Chronic Instability, Ankle Acute Sprains	Evidence is limited. Some studies report pain reduction with KT in unstable ankles during functional tasks (Basnett et al., 2013). In acute sprains, evidence is weaker compared to the standard RICE protocol.	Limited evidence. Potential role in managing functional pain in chronic instability.
Lateral Elbow	Lateral Epicondylalgia (Tennis Elbow)	Studies generally show no significant advantage of KT over sham tape or other interventions like eccentric exercise for long-term pain relief	Limited to no evidence for superior efficacy over sham or active comparators.

(Zhong et al., 2020; Pramana et al., 2022).



Figure 1: Summary of Evidence for Kinesiology Taping on Pain Across Anatomical Regions

Shoulder Pain

Shoulder pathologies, most especially subacromial impingement syndrome, are one of the more common areas in which KT is applied. A 2022 RCT conducted by Zaki et al. concluded that KT, in combination with physiotherapy, yielded a statistically significant improvement in pain, as measured by VAS, in comparison to physiotherapy alone or sham taping during a 4-week follow-up evaluation. Shakeri et al. (2013) equally reported that both facilitatory and inhibitory KT techniques were useful in reducing pain in patients with shoulder impingement, with effects lasting for two weeks. The theoretical mechanism involves the tape application to depress the humeral head, thereby creating more subacromial space theoretically and less mechanical compression. However, a critical review by Montalvo et al. (2014) observed that effect sizes from many of these positive

studies are often small, and the clinical relevance beyond statistical significance is debatable. Additionally, the strong placebo effect stemming from the tactile sensation of the tape cannot be discounted.

Knee Pain

The evidence for patellofemoral pain syndrome is mixed. Aytar et al. (2011) showed that KT applied with medial glide and fascial correction techniques significantly reduced pain during functional activities like stair descent compared to a no-tape control group. More recently, a 2022 RCT by Mohamed & Alatawi involving knee osteoarthritis patients found that KT resulted in greater pain reduction than sham tape or usual care at 4 weeks. In contrast, a well-designed RCT by Rehman et al. (2020) discovered that KT was no more effective than sham taping in reducing pain or improving function in women with PFPS when both groups performed the same exercise program. These findings suggest that context and expectation may play a role in the perceived benefit.

Low Back Pain

Another condition in which KT is widely used is nonspecific low back pain. Júnior et al. conducted a 2019 study that found KT to be effective in reducing pain and disability in patients with chronic LBP, with effects superior to sham taping. Usually, the tape is applied over the paravertebral muscles with tension intended to provide support and proprioceptive feedback that may promote better posture and muscle activation. A 2023 systematic review and meta-analysis by de Brito Macedo et al. supported the short-term efficacy of KT for pain relief in LBP; however, they also pointed out that the quality of evidence was low to moderate and long-term benefits were unproven.

The Efficacy of Kinesiology Taping on Range of Motion

The impact of KT on ROM is arguably even more contentious than its impact on pain, with data from research studies showing substantial variability. Data are summarized in Table 2 and Figure 2.

Table 2: Summary of Evidence for Kinesiology Taping on Range of Motion by Anatomical Region

Anatomical Region	Condition / Context	Key Findings from Included Studies	Overall Conclusion
Shoulder	Post-Stroke Hemiplegia, Impingement	Strongest evidence in neurological populations. Multiple RCTs show significant improvements in shoulder flexion and abduction in post-stroke patients vs. sham (Dall'Agnol & Cechetti, 2018; Yoon & Kim, 2022). In impingement, evidence for ROM gains is weaker than for pain.	Strong evidence in neurological rehab; weak in musculoskeletal. Effective for facilitating movement in hemiplegic shoulder.
Ankle	Ankle Dorsiflexion,	Several studies on healthy subjects and those with limited dorsiflexion show small but significant immediate	Moderate evidence for immediate gains in dorsiflexion. Clinical carryover to function is less clear.

	Chronic Instability		improvements in dorsiflexion ROM after KT (Basnett et al., 2013; Lee & An, 2021). The mechanism is unclear (pain reduction vs. mechanical effect).	
Hamstrings	Hamstring Flexibility		Studies on healthy athletes consistently show that KT does not improve passive hamstring flexibility more than static stretching alone or sham taping (Chang et al., 2010; Rehman et al., 2020).	Strong evidence of NO significant effect on improving hamstring flexibility.
Cervical Spine	Neck Pain, Forward Head Posture		Mixed results. Some studies report small improvements in cervical ROM (rotation, lateral flexion) with KT (González-Iglesias et al., 2009), while others find no difference compared to laser therapy or manual therapy (Pramana et al., 2022).	Limited and conflicting evidence. Any effects are likely small and short-term.



Figure 2: Effects of Kinesiology Taping on Range of Motion Across Clinical and Functional Contexts
Shoulder Range of Motion

The most convincing data regarding KT's impact on ROM relate to neurological rehabilitation, especially in the hemiplegic shoulder following a stroke. Studies by Dall'Agnol & Cechetti (2018) and more recently by Yoon and Kim (2022) have consistently shown that KT to facilitate the supraspinatus and deltoid muscles results in significant improvements in active shoulder flexion and abduction ROM compared to sham taping or conventional therapy in isolation. In this population, increased sensory input from the tape might benefit motor unit recruitment and help overcome neuromuscular inhibition. In contrast, for musculoskeletal shoulder conditions such as impingement, the evidence for ROM improvement is weaker. While gains are sometimes reported, these are

often secondary to pain reduction rather than a direct mechanical effect on joint kinematics.

Ankle Range of Motion

Restoration of dorsiflexion ROM is an important component in the rehabilitation process for ankle sprains. Basnett et al. (2013) demonstrated that KT application to the ankle enhanced weight-bearing dorsiflexion ROM immediately post-application and at a 48-hour follow-up in participants with chronic ankle instability. The suggested mechanism is that the tape facilitates anterior glide of the tibia on the talus or inhibits the gastrocnemius-soleus complex. Likewise, Lee & An (2021) identified an immediate improvement in dorsiflexion in healthy individuals with limited ROM. It remains unclear whether these small, immediate improvements result in meaningful functional gains or are superior to more traditional mobilization techniques.

Hamstring Flexibility

In contrast to the findings for the ankle, the evidence for KT improving hamstring flexibility is overwhelmingly negative. Several RCTs investigating healthy, athletic populations have shown that the application of KT using a facilitatory technique to the hamstrings resulted in no significant change in passive knee extension angle, as measured by the sit-and-reach test or goniometry (Chang et al., 2010; Rehman et al., 2020). Such findings argue against a mechanical or neurological influence of KT on muscle extensibility and support the view that KT has a negligible role in the improvement of flexibility.

The Placebo Effect and Methodological Considerations

A critical factor permeating the KT literature is the potent placebo effect. The peculiar look and feel of the tape, plus the therapeutic ritual of its application by a clinician, make for a powerful influence on the patient's perception of both pain and function (Mak et al., 2019). Most RCTs attempt to control for this with a "sham" or "placebo" taping group where an identical-looking tape is applied with no tension or in

a non-therapeutic pattern. That many studies find no significant difference between true KT and sham KT groups strongly suggests that a substantial portion of its benefit is non-specific (Parreira et al., 2014).

Methodological challenges also abound. Standardization of KT application is lacking (quantity of tension stretched, for example: 25%, 50%, 75% stretch; direction of facilitation versus inhibition; cutting pattern, for instance, I-strip, Y-strip, fan cut); skills and experience of the tape applicator may also vary, which can affect results. Blinding is a major issue herein: whereas blinding of participants is often possible, the therapist applying the tape cannot be blinded, which may give rise to performance bias.

Discussion and Future Directions

This review synthesizes a decade of research related to the efficacy of KT for pain and range of motion, leading to a general conclusion that KT is not a panacea but a modality with specific and limited applications. Evidence shows that its effects on pain are generally small, short-term, and likely mediated by a combination of minor physiological mechanisms and a significant placebo response. With respect to range of motion, findings are highly context-dependent: while KT is promising for facilitating movement in neurological populations, it has little to no effect on passive muscle flexibility in either healthy individuals or those with musculoskeletal conditions. This nuanced understanding is important for contextualizing its role in clinical practice.

For clinical practice, KT can be considered a safe and potentially useful adjunct to a comprehensive rehabilitation program that includes exercise therapy, manual therapy, and patient education. Its primary value may lie in transient pain relief, which can enable a patient to engage more fully and comfortably in essential therapeutic exercises. In neurological populations, such as post-stroke rehabilitation, it appears to be a valid tool for facilitating improved movement patterns. However, the clinician needs to manage patient expectations proactively by clearly communicating that the tape is a facilitator within a broader treatment strategy, not a cure, and that its benefits are often subtle and temporary. This helps to align patient goals with realistic outcomes and prevents over-reliance on a single modality. Looking ahead, future research must transcend the foundational question of "Does it work?" and focus on more sophisticated and nuanced inquiries. First, key directions include delving deeper into how it works via mechanistic studies. Advanced tools, such as neuroimaging (fMRI), quantitative sensory testing, and high-fidelity biomechanical analysis, could determine objectively how KT influences the nervous system and alters movement patterns (Halseth et al., 2004; Binaei et al., 2021). Second, establishing dose-response relationships and standardization by developing definite protocols for tape tension, application direction, and duration for specific clinical conditions significantly enhances the reproducibility

of research and the consistency of clinical application (Kalron & Bar-Sela, 2013).

A third critical avenue is identifying patient responders. Future studies should conduct subgroup analyses to pinpoint specific patient characteristics, including those with a high psychosocial load or distinct somatosensory profiles, that may predict a more positive response to KT and enable treatment in a more personalized and effective way. Finally, research must prioritize long-term outcomes, focusing on high-quality randomized controlled trials with extended follow-up to definitively determine whether the short-term benefits reported in many studies translate to functional improvements sustained over time and clinically meaningful reductions in disability.

Conclusion

This review supports the fact that the effectiveness of Kinesiology Taping in improving range of motion and reducing pain is variable and condition-specific. Although this may provide a slight, short-term pain-reducing benefit for conditions such as shoulder impingement and low back pain, and may assist ROM in neurologically impaired shoulders, the benefits are often no greater than sham taping and are generally inconsequential with respect to enhancing flexibility in otherwise healthy individuals. The powerful context effects of KT include patient expectation and the therapeutic ritual. Hence, KT should not be used in isolation but might be judiciously used as an adjunct to a multimodal, evidence-based rehabilitation strategy. Studies investigating the mechanisms, optimizing application modalities, and identifying specific patients who are most likely to benefit from its subtle but potentially useful effects will shape the future of KT research.

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