

# Effectiveness of Kinesio Taping in Chronic Ankle Instability: An Update

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## ABSTRACT

Kinesiology taping is a technique used as a clinical and remedial method to treat strained ankle and ankle instability in athletes. It seems to lessen muscle imbalances by supporting weaker muscles and assisting in adaptation of muscle function in patients with chronic ankle instability. In kinesiology taping adhesive elastic tape is used in different colours stimulating skin receptors to improve neuromuscular control and lymphatic drainage. The aim of this review is to explore the efficacy of kinesiology taping application as a supplemental approach in chronic ankle instability. According to 25 studies included in our review, kinesiology taping application in chronic ankle instability has been proved to be a choice of treatment in rehabilitation of unstable ankle. Selected studies demonstrated that following application of kinesiology taping in conventional rehabilitation of chronic ankle instability resulted in increased muscle strength and stability, along with improved balance, range of motion, stiffness and decreased perception of pain which resulted to be beneficial in the treatment of ankle dysfunction and instability.

**Keywords:** Chronic ankle instability, Proprioception, Kinesiology taping, Ankle balance taping

## INTRODUCTION

Ankle sprains which are more common in women, account for one-fourth of all sports injuries. The ankle is the second most common body part injured in sports after knee sprains. Following the initial ankle sprain, patients often experience high rates of recurrence, ongoing pain, reduced physical activity, worsening quality of life, a higher chance of developing ankle osteoarthritis, and a predisposition to develop chronic ankle instability (CAI). Postural control relies on vestibular, proprioceptive, and visual input; hence, a lateral ankle sprain (LAS) can impede postural control by damaging

proprioceptors. <sup>(1)</sup> CAI is a musculoskeletal condition characterized by symptoms including decreased ankle mobility recurrent episodes of LAS and the feeling that the ankle is giving way <sup>(2)</sup>. Proprioceptor impairment in ankle ligaments, muscular weakening, and limited ankle joint mobility are all linked to CAI, which can be understood as ligamentous and pericapsular laxity-induced functional instability. Ankle sprains in the past increased the risk of CAI. The damage arises from the ligaments supporting the ankle being overstretched beyond their normal physiological limitations. <sup>(3)</sup> The rapid inversion of the ankle joint, which affects the somatosensory

system as well as joint structures, is the mechanism of damage in CAI. The condition known as chronic ankle instability (CAI) is linked to decreased ankle dorsiflexion range of motion (DFROM), sensory impairments, and altered arthrokinematics. Additionally, it might cause after-effects from the original ankle sprain incident, like persistent pain and swelling, subjective feelings of instability, and recurring bouts of giving way.<sup>(4)</sup>

CAI can lead to financial and physical strain, reduced activity, and an increased risk of ankle osteoarthritis (OA). Therefore, physical therapy plays a crucial role in preventing and treating CAI. Early mobilization, taping, and balance instruction are key components of existing CAI treatment methods. Kinesiology tape, developed by Dr. Kenzo Kasein 1998, is a water resistant tape that can be elongated to 90-140% of its original size. It is used for therapy and prevention of CAI and has been widely used in clinical and athletic settings.<sup>(5)(6)</sup>

Both elastic and non-elastic taping methods are used to treat strained ankles in athletes. Kinesio taping (KT), is particularly effective in preventing sudden hyper supination of the ankle joint, and is preferred by physical therapists for treating ankle instability. KT is more comfortable than traditional taping methods as it can imitate the behaviour of the skin. One of the primary effects of KT is to reduce muscle imbalances by providing support to weaker muscles and assisting in the adaptation of muscle function and motion.<sup>(7)</sup>

KT comes in different colours, and is used to stimulate skin receptors, improve neuromuscular control, and improve lymphatic drainage by exerting an elastic pull effect on deeper tissues. It has been observed that proprioceptive outcomes improve in patients with ankle instability after using KT for 72 hours. KT has not been shown to have any adverse effects; whereas non-elastic tape has been found to impair performance. KT has shown impact on ankle range of motion.<sup>(8)</sup> It has been

widely used in the field of rehabilitation and sports sciences in recent years for various reasons such as injury avoidance, pain management, enhancement of functions and improvements in muscle extensibility and activity. Some studies have shown its impact in averting recurrent ankle sprains and enhancing ankle joint stability. KT is also more comfortable and interferes less with the ankle's natural ability to function, making it better than other functional support techniques.<sup>(6)</sup>

KT is popular stabilizer for musculoskeletal conditions. It can help athletes avoid injuries, lessen the strain on damaged tissue, maintain normal muscle tone, realign subluxated joints, enhance proprioception, and circulation, and reduce pain. Another widely used approach to improve athlete performance is KT in sports medicine. Numerous research studies have evaluated the effectiveness of KT in enhancing athletes' specific performance while treating ankle sprains and CAI in athletes.<sup>(9)</sup>

Therefore, this study aims to explore the updates on the efficacy of kinesiology taping application as a treatment approach in chronic ankle instability.

## METHODOLOGY

An updated review was conducted from 2015-2023 using databases such as PubMed, Google Scholar, and ResearchGate. The search was conducted using the keywords Chronic ankle instability, Proprioception, Kinesiology taping, and Ankle balance taping. It included data from experimental studies, with the majority of being randomized control trials. The studies summarized the effects of kinesiology taping in the treatment and prevention of chronic ankle instability, as well as its role in overall ankle health.

## Kinesiology Taping Techniques

KT is applied according to Kenzo Kase's KT manual by a trained physiotherapist. Patients are advised to shave the leg. The tape is stretched approximately 20-25 % of its original length and is applied on

vertically placed affected leg with the ankle in slight plantar flexion. <sup>(6)</sup> The new ankle balance technique (ABT), Kenzo Kase technique (KKT) and the placebo technique are the three techniques demonstrated here. First, participants are seated in a comfortable position with their ankles in neutral position. The kinesiology tape is then applied by a physical therapist.

### **Kenzo Kase Technique**

In KKT subjects are seated with their ankles slightly flexed. As stated, the KKT is carried out in following steps, start the first anchor at the anterior mid-foot, stretching 0%, then stretches 20%, reaching the tibial tuberosity together with the tibia bone. Second anchor starts with the medial malleolus as the anchor, stretching it to 20% before continuing below the calcaneus end next to the initial tape. The third anchor starts at the medial malleolus and stretches to 20% across the anterior side of the ankle joint, ending at the lateral malleolus. Fourth anchor starts at the medial malleolus at 0% stretch, continues at 20% stretch past the foot arch, and ends at the top of the foot. <sup>(10)</sup>

### **Ankle Balance Taping**

The patient lies comfortably on a table raised enough so that their feet are off the ground while therapist applies tape to the injured ankle at a tension of thirty to forty percent. Taping for ankle balancing requires four steps. Increased ankle dorsiflexion occurs in the initial phase of posterior talar gliding tape. The patient's ankle is considerably dorsiflexed as a result of the tape, which begins at the front of the talus, passes through both malleoli, and ends around the calcaneus. The second step for the ankle inversion is inversion taping. The tape is placed starting 5 cm above the internal malleolus, passing through the back and down the external malleolus, and ending with a wrap around the sole that terminates inside out once the patient's ankle has been partially inverted. The next step involves taping the ankle in an everted position. It starts 5 cm above the external

malleolus and lifts the patient's ankle to a slightly elevated posture. It then travels down the internal malleolus and through the back before enveloping the sole from the inside to the outside. The kinesiology tape is applied two times at this point, with roughly 50% overlap. When a patient's lateral ankle injury prevents them from inverting their foot, eversion taping is applied twice to improve inversion of the ankle. The fourth phase involves applying the posterior talar gliding tape that was done twice in the previous stage when the ankle is somewhat dorsiflexed, for the purpose of increasing dorsiflexion, taping starts at the talus, goes around the malleolus on both sides, and finishes around the calcaneus. <sup>(11)</sup>

### **Ankle Placebo Taping (APT)**

The subject is comfortably seated; both ankles are covered with kinesiology tape that had been stretched by roughly 30%–40%. The origin and insertion sites are not stretched, thus the skin is left unharmed, and measuring only 2-3 cm. APT involved two steps: first applying tape up to 50% of the space beneath the inner knee from below the medial malleolus, and secondly applying taping to 50% of the area below the outer knee from below the lateral malleolus. <sup>(12)</sup>

### **Effectiveness of Kinesiology Taping on Balance**

KT can enhance the dynamic ability to balance in the lower limb and improve ankle proprioception in patients of CAI in a short period of time. When KT is implemented, it stimulates skins' outer layer due to which sensory input information of the skin is induced, enhancing sensory afferent output resulting in the formation of routes of perception and senses in the CNS along with increased reflex arch path. It results in improved CNS control over periphery whilst enhancing balance, stability and proprioceptive function. College basketball players with functional ankle instability (FAI) can benefit from KT by having more plantar flexion and isokinetic strength in their ankle dorsum muscle. During dynamic

sports, KT can considerably improve collegiate basketball players' ability to balance.<sup>(13)</sup>

Following a single session, taping did not significantly improve balance; but, after two weeks and two months. Since proprioception makes up 70% of the signal, the central nervous system receives to regulate either static or dynamic balance; the improvement in balance is connected to how taping and bandaging improves proprioception. Additionally, having a precise awareness of joint position gives one more control over joint position, which increases the free swing leg's reaching distance.<sup>(14)</sup>

To compete at the top level and prevent lower limb injuries, one must possess superior balance. Numerous researchers have made an effort to enhance balance in athletes and healthy individuals by applying the proper interventions to the ankle. KT is a well-liked elastic tape technique that works by supporting weaker muscles, repositioning joints through mechanical correction, or improving proprioception through enhanced stimulation of cutaneous mechanoreceptors. Studies shows that in healthy individuals, KT is helpful in improving single leg dynamic balance. By improving proprioception through greater activation of sensory receptors, facilitating muscular contraction, or supporting joints without restricting their flexibility in stroke patients and patients with ankle instability, KT affects postural balance. According to earlier research, individuals with ankle problems showed improved balance after just one treatment of KT to the ankle, corrected ankle abnormalities in ankle instability and stroke patients by applying KT in dorsiflexion and eversion directions to the afflicted ankle. In comparison to no tape and athletic tape, it has been seen that KT has greater impact on dynamic postural control in star excursion balance tests. Also KT enhanced the scores of reach tests; the berg balance scale test, and the center of pressure in the individuals.<sup>(15)</sup>

KT helps ankle instability patients perform better on dynamic balancing activities, additionally KT affects physiological as well as psychological aspects contributing to patients' involvement in postural control because after wearing the tape for 7 days, individuals feels more stable and confident in their posture.<sup>(16)</sup>

The mechanoreceptor stimulation and tactile stimulus supplied by KT made up for the afferent feedback that is lost as a result of exhaustion, and these are two potential methods for how KT application sustained dynamic equilibrium as a result of inhibiting the effects of tiredness. Thus, KT treatment maintains dynamic equilibrium and prevents tiredness.<sup>(17)</sup>

### **Effectiveness of Kinesiology Taping on Range of Motion (ROM) and Stability**

Acute ankle KT injections impart eversion stress to the lateral side of the ankle joint; they improve ankle lateral range of motion, which may be advantageous for athletes with chronic ankle instability. This defense reduces the range of motion for ankle inversion as well as medio-lateral sway velocities, which in turn reduces the amplitudes of the peroneus longus muscle, which is in charge of lateral ankle stability. Acute KT administration may provide the ankle with lateral mechanical support in athletes with chronic ankle instability, perhaps reducing the amount of muscle activity and frontal plane sway velocity. KT may help people with chronic ankle sprains improve their static joint stability, which means it might be a viable alternative for a safe return to activity.<sup>(7)</sup>

It is possible that KT strengthened the damaged joint's stability and the soft tissue surrounding it, avoided abnormal muscle activity from impairing the normal joint's ability to move, reduced the pain from overexertion, decreased the likelihood of a fatigue-induced spasm, improved the damaged muscle's capacity to contract, and preserved the joint's normal joint ability of movement. When combined, these

mechanisms can strengthen muscles and less perception of pain.<sup>(13)</sup>

It was found that passive stretching occurred when KT was applied to unstable ankle joints in stroke patients compared to other methods, it was seen that taping decreased muscle tension and increased joint ROM. Ankle joint taping was found to be a more effective way to alleviate and maintain muscle tension than a passive stretching method. KT can either encourage or prevent the tension in moving muscles. Medial and lateral gastrocnemius muscles tone and stiffness are reduced when KT is applied to ankle joint leading to correction in ROM of ankle.<sup>(18)</sup> KT seems to be helpful in enhancing ankle ROM. After application of KT on athletes experiencing calf pain, result indicated a rapid rise in ankle DFROM.<sup>(15)</sup>

### **Effectiveness of Kinesiology Taping on Proprioception**

Ankle proprioception improves after K taping as a result of close contact between skin and tape causing increased rate of cutaneous receptor mainly mechanoreceptors which majorly helped in improving foot position sense. Besides this taping is also reported to increase perception of stability, confidence, and reassurance.<sup>(14)</sup> Afferent fibers in muscles transmit proprioceptive signals from proprioceptive receptors found in muscles, ligaments, capsules, transdermal tissue and other tissues. For the majority of the body's joints, muscle afferent fiber carries the most crucial information. Control of proprioception is probably going to deteriorate along with the joint mobility, protective reaction, postural control, and the ability to regulate disruptions. Since proprioceptive control is essential in preventing functional instability and subsequent joint damage, a loss of it may lead to diminished joint stability and an increase in the frequency of injuries. When KT is applied on the muscles without going too far, one of the several methods for stabilizing the ankle K taping aids the muscles in additional possible way while

restoring the skin and muscles to their accurate positions.

It seems that if taping is applied in a manner that leaves adequate room between the skin and the muscles, the muscles will be more mobile and the pain will be lessened because of proprioception and active blood circulation. KT stimulates cutaneous mechanoreceptors more, which results in an increase in proprioception. Thus, taping may be useful in management and avoidance of ankle instability since it enhances proprioceptive control during dorsiflexion and inversion.<sup>(19)</sup> KT helps to lessen the individuals self-reported feelings of instability with modest benefits seen in both tension and non-tension settings. For everyday and athletic activity, KT delivers a sense of joint stability and security as well as vital visual and sensor input.<sup>(20)</sup>

### **Effectiveness of Kinesiology Taping on Muscle Strength**

KT intervention may aid in the development of stronger ankle isokinetic muscles in individuals with FAI. Traction on the subcutaneous tissue may have resulted from the elastic KT retraction force itself, stimulating neuromuscular junctions and enhancing muscular strength. This may explain why the KT was able to increase the subjects' ankle joints' isokinetic muscle strength. KT may decrease the pain caused by hyper stretching of the muscles, improves the ability of the injured muscles to contract, and decrease the risk of spasms. KT improves the damaged muscle's ability to contract, lessens the pain from overexertion, decreased the likelihood of a spasm from fatigue, strengthened the damaged joint's stability and the soft tissue around it, avoids abnormal muscle activity from impairing the normal joint's ability to move, and preserves the joint's normal range of motion. Together, these processes can strengthen muscles and lessen the sense of pain.<sup>(13)</sup>

**Effectiveness of Kinesiology Taping on Ankle Stiffness**

One technique that can either encourage or prevent the tension in moving muscles is KT. Applying KT to the ankle joint lowers the medial and lateral gastrocnemius muscles' tone and stiffness. <sup>(18)</sup>

KT can be applied on ballet dancers as they are more prone to ankle instability and lateral ankle sprains. With regard to inversion-eversion motion, the KT support results in around 20% more restriction; this could help ballet dancers avoid lateral ankle sprains. Ballet dancers experience instability in the frontal plane as they go from flat-footed standing to standing en pointe. Ballet dancers may invert their foot during the transition rather than immediately initiating plantarflexion, which could exacerbate the condition that results in a lateral ankle injury. Applying KT method may assist restriction of inversion-eversion movement without reducing dorsiflexion range of motion. The KT trial's elongation effects of the Kinesio tape are likely to activate cutaneous mechanoreceptors, which

subsequently sent information regarding joint position and motion. This result most likely triggers a tensile/elongation process through biofeedback mechanisms, which increases mechanoreceptor activity. <sup>(21)</sup>

**Effectiveness of Kinesiology Taping on Plantar Pressure**

Applying the KT, the loading rate rises in the middle region of the sole and the fifth metatarsal. Moreover, the duration of the push-off stage in front of the foot increases after the application of KT. More research on the spatiotemporal gait variables of the foot joints following the use of KT appears warranted. The heel area has the most pressure both before and after the KT, while the fourth metatarsal has the lowest pressure. The peak of plantar pressure in individuals with an ankle sprain before and after applying the KT only have an impact on midpoints; After applying the kinesio tape, there is an increase in pressure in the middle region of the foot's sole and in the fifth metatarsal. <sup>(22)</sup>

**Table 1: Studies on effect of Kinesio tape on ankle.**

S. no	Author	Title	Methodology	Outcome measures	Result
1	Rabeeh Hariri et al. <sup>(6)</sup>	The immediate impact of Kinesio tape on patients' ability to balance after sustained ankle sprains	60 people (27 men and 33 women) with a history of ankle sprains participated in a randomised, single-blind, parallel group trial and were split into an experimental and control group at random. This was transported for two days.	Center of Pressure (cop) measurement	In contrast to the control group The KT group had higher COP displacement.
2	Chairat et al. <sup>(10)</sup>	Comparison of Kinesiology Taping Techniques to Promote Ankle Stability in Male Football Athletes with Chronic ankle instability	In this crossover experimental investigation, subjects received three distinct K taping procedures administered continuously for three days. The research comprised 40 athletes.	Modified star excursion balance test	Group of athletes which were applied with new ankle balance technique (NBT) of kinesiology taping showed improved dynamic balance.

3	Myoung et al. <sup>(11)</sup>	Immediate effects of ankle balance taping with kinesiology tape for amateur soccer player with lateral ankle sprain	In this crossover randomized study 22 soccer player having ankle sprain were included Participants were divided into three groups at random: ankle balancing, placebo taping, and no taping.	GAITRite portable walk way system was used to assess gait	Measures of stride length and velocity were greater in balance taping group. The H-H base support showed a statistically significant decrease ( $p<0.05$ ) in the Ankle Balance Taping group, but the placebo group showed a greater velocity ( $p<0.05$ ) than the group that did not get tape.
4	Hyun et al. <sup>(12)</sup>	Immediate effects of balance taping using kinesiology tape on dynamic and static balance after muscle fatigue	In this randomized controlled single-blinded study. Participants were randomly divided into control group and experimental group. Taping was performed on both group. In both groups static and dynamic balance was evaluated.	BioRescue for measuring balance	Ellipses in the static and dynamic states of the fatigued ankle surface area decreased in the ankle balance taping group after tape ( $p<0.05$ ).
5	Rui Li et al. <sup>(13)</sup>	Impact of kinesio taping intervention on collegiate basketball players with functional ankle instability's muscular strength and balance	Thirty collegiate players with AI were treated with the KT method in this experimental investigation.	Swiss isokinetic tester was used for testing flexion and extension; static balance test for balance	Using the KT method results in a 34% and 19.9% increase in ankle dorsiflexion and plantar moment, respectively.
6	Motaz et al. <sup>(14)</sup>	The short- and long-term effects of ankle joint taping and bandaging on balance, proprioception, and vertical jump are investigated in volleyball players with chronic ankle instability.	One hundred CAI patients were allocated into three groups in this randomised controlled trial: the intervention group, the control group, and tape bandaging group. The three interventions— ankle bandaging, ankle rigid taping, and placebo taping—were tested on the individuals for two weeks and two months.	Y balance test, vertical jump tester was used to assess balance and vertical jump height	After 2-weeks and 2-months, there were significant differences between bandaging and control groups, and taping and control groups for proprioception, balance, and vertical jump ( $P < .05$ )
7	Melda et al. <sup>(15)</sup>	Is it possible for healthy people to instantly alter their range of motion, muscular strength, and balance using ankle kinesio taping?	In this randomised, sham-control trial, K taping was applied to 40 healthy students who were split into experimental and sham-controlled	Balance parameters by Biodex Balance System, Limits of Stability (LOS), athlete single leg test for dynamic balance, sensory integration of	Only experimental KT group's showed significant improvement ( $p=0.02$ ), whereas the LOS score in increased in both the groups ( $P<0.05$ ).

			groups. The measurements were taken both before and after the 45-minute intervention.	balance by biodex system	
8	Kien Ly et al. <sup>(16)</sup>	The effects of Kinesiology Tape on static postural control in individuals with functional ankle instability	Twenty young persons, ages 18 to 30, who had functional ankle instability were involved in this repeated-measurement research. They walked in silent, still, immobile bipedal and unipedal positions. Three separate times were measured: immediately after the baseline (without tape), 24 hours later, and while the tape was still on the ankle.	Postural control by MATLAB software	Following KT application, there were slight alterations seen in the mean velocity and mean power frequency (MPF) in unipedal postures. Overall, the increase in postural control was negligible.
9	Gustavo et al. <sup>(20)</sup>	Different kinesio taping tensions present similar benefits for postural control, dynamic balance, agility and instability sensation in individuals with chronic ankle instability: randomized clinical trial.	Twenty-one young people (aged 18 to 35) with CAI were randomly allocated to the KT group with tension (KTT) or the KT group without tension (KTWT) in this randomised clinical research. K. Taping was administered once a week at a seven-day interval, leaving the tape on for four days.	Force platform for postural control, side hop test for agility, modified star excursion balance test for dynamic balance, Cumberland Ankle tool instability, Foot and ankle outcome score.	For all groups, KT enhances postural control, agility (p<0.001), dynamic balance (p<0.001), and sense of instability (p<0.001).
10	Javad et al. <sup>(7)</sup>	The effect of ankle taping on ankle joint biomechanics during unilateral balance status among collegiate athletes with chronic ankle sprain	The design is case control study. Thirty collegiate athletes—eleven females and nineteen males—with chronic ankle sprains were recruited.	Delsys surface electromyography for recording Maximum voluntary isometric contractions (MVIC) single leg balance test	After KT application, a significant reduction was seen in amplitudes of the peroneus longus activity (p=0.042, d=0.55) and ankle range (p<0.048).
11	Young-Han et al. <sup>(18)</sup>	Effects of the kinesio taping technique on chronic stroke patients' ankle muscle tone, balance, and range of motion	10 stroke patients randomly divided into experimental groups 1 and 2. Group 1 was applied with ankle stabilization taping and group 2 with	Berg balance scale was used to assess balance	In both the groups muscle tone and stiffness showed significant differences in both the groups (p<0.05). The berg balance scale also showed significant

			muscle control taping for 2 times a week for a total of 6 weeks		differences in both the groups.
12	Hyun-Do Seo et al. <sup>(19)</sup>	Effects of Kinesio taping on joint position sense of the ankle	In this study, 26 healthy people with an ankle sprain were enrolled. Eight patterns of KT were administered on the ankle's lateral and medial ligaments. Isokinetic apparatus was used to measure joint position sensation.	Isokinetic equipment (dynamometer, biodex medical system) was used to find Joint position sense	Following kinesio taping, joint position perception improved in dorsiflexion and inversion positions.
13	Aline E et al. <sup>(21)</sup>	Effect of Kinesio® Taping on Ankle Complex Motion and Stiffness and Jump Landing Time to Stabilization in Female Ballet Dancers	In this mixed model repeated measure design study, 12 amateur ballet dancers without a history of ankle injuries were enrolled.	Ankle arthrometer	Result showed that there was not much improvement in time of stabilisation in ballet dancers.
14	Elahe et al. <sup>(22)</sup>	The immediate effects of kinesio Tape intervention on plantar pressure parameters in individuals with functional ankle stability	29 males with functional ankle instability and at least two sprains per month were included in this quasi-experimental investigation. Using G Power software, the sample size was chosen, and K Taping Intervention was used to treat them.	Footscan® system for measuring plantar pressure	Result showed improved plantar pressure, and dynamic stability of the ankle after K taping intervention.
15	Noh et al. <sup>(17)</sup>	Effects of Kinesio® Taping on Dynamic Balance Following Fatigue: a Randomized Controlled Trial	In this randomized control trial 72 participants were divided into four groups Group A (KT and fatigue), Group B (no tape and fatigue), Group C (KT and no fatigue), Group D (no tape and no fatigue) and was applied with KT	Star excursion balance test was used for assessing dynamic balance	Result showed that KT application reduced fatigue and maintains dynamic balance.

## DISCUSSION

This review aims to provide update on the efficacy of kinesiology taping application as a treatment approach in chronic ankle

instability. The use of KT in CAI demonstrates how taping can be a beneficial treatment option for rehabilitating an unstable ankle. KT impacted ankle muscle

activity amplitudes, postural sway, and lower limb joint angles in collegiate athletes who had persistent ankle sprains during single-leg balance tasks.<sup>(7)</sup> When the kinesiology tape was stretched, the sine wave pattern beneath it served as a mechanism for the tape to return to its original position. The pulling force parallel to the tape caused by the sine wave is combined with the resolution force and the horizontal force. The athlete was able to move freely with support, and the taping effect did not cause any injuries. Kinesiology taping has been demonstrated to enhance proprioceptive sense by stimulating cutaneous mechanoreceptors, which activates the proprioceptive sense to support and secure the consistency of the ankle joint during the movement of the centre of mass and increasing the distance that the opposing leg can reach. The 20 percent elongated tape can activate the cutaneous mechanoreceptor of the skin and surrounding muscle to provide feedback for the adaptive muscle tension around the joint, and KT exhibits an enhancement pattern in normalized reach distance.<sup>(10)</sup>

An absence of proprioceptive sensation has been suggested as the cause of ankle instability, leading to a loss of neuromuscular control. An increase in afferent sensory signals from skin receptors may be facilitated by elastic tape and placebo, explaining the reported improvements in results. Different KT applications, such as muscle approach, tendon and/or ligament modification, or a mix of techniques, may be used to treat the same injury.<sup>(23)</sup>

In 2023, Rui et al. conducted a study which found that after an acute KT intervention, there was a 34% increase in the ankle dorsiflexion movement and a 19.9% rise in the ankle plantar flexion movement. During the stable plane test, there was a 1% decrease with participants' eyes open and a 1.1% decrease with their eyes closed. The swaying environment test increased by 2.4% with participants' eyes open, and by 5.1%, with their eyes closed. Additionally, it

increased by 16.2% when participants were eyes closed.<sup>(13)</sup>

In 2022 Pan et al. studied the effects of KT techniques on postural control in patients with ankle instability following ankle muscular exhaustion. The Y-balance test results showed that KT significantly increased the posterolateral and posteromedial reaching distances.<sup>(24)</sup> Donghwan et al. demonstrated that Ankle-KT significantly improved ankle DFROM, Biodex Balance System, Dynamic Gait Index, and reduced the Time Up and Go test time in comparison to barefoot intervention. These findings indicate that KT can help stroke patients improve ankle DFROM and balance.<sup>(25)</sup> KT has been shown in some studies to be beneficial for improving patients' ankle balance, it is used as an additional therapy to help patients with chronic ankle sprains.<sup>(6)</sup> Furthermore, the administration of KT was found to be beneficial in improving postural control, dynamic balance, agility, and instability in people with CAI without affecting the tension on the tape. As a result, KT demonstrates that its usefulness as a tool for treating persistent ankle instability.<sup>(20)</sup>

## CONCLUSION

This study concluded that KT helps in the rehabilitation and prevention of ankle instability. It assists in preserving dynamic balance and improving proprioception. The results showed that KT helps preserve balance, and range of motion of the ankle, and improves ankle muscle stiffness, stability, and proprioception. Ankle balance taping was identified as the most effective technique of kinesiology tape.

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