

# Systematic Review: Effects of Using Kinesio Tape on Treatment of Lateral Epicondylitis

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## ABSTRACT

**Purpose:** The aim of this study is to investigate the effects of Kinesio taping on severity of pain, the power for taking hand, functional activity and we undertook a literature review to produce evidence-based recommendation for the use of Kinesio tape in patients with lateral epicondylitis.

**Methods:** A literature search was done in google scholar, pubmed, science direct, proquest, medline, advanced google and pedro database. The following keywords were used: Kinesio tape, elastic tape, Taping technique, Pain, Grip strength, Lateral epicondylitis, and tennis elbow. The inclusion criteria were English and Persian articles which were published from 2000 to 2013 and articles which were case report were excluded.

**Results:** 26 articles including randomized clinical trial, cohort study, case-control study and trial which included healthy population, patients, male and female at any age range were extracted. 11 articles had the inclusion criteria.

**Conclusion:** Although Taping technique seems to an impressive effect on wrist extension, grip strength, function and pain in individuals with lateral epicondylitis, strong evidence to identify the underlying mechanisms is still not available.

## 1. Introduction

Lateral epicondylitis is a common pathology in the elbow which is shown as a pain in outer part of elbow and can be accompanied by pulsating pain in the forearm [1, 3, 4, 5]. Its prevalence in society is 1% -3% [2] and it is equal in male and females [4]. (But in tennis players, male suffer more than females). It is more prevalent among 35-50 years old individuals and usually the hand is inflicted [6]. This problem initially inflicts extensor carpi radialis brevis and sometimes extensor digitorum, extensor carpi radialis longus and very little Extensor carpi ulnaris [7]. Cyriax ascribe the symptoms of lateral epicondylitis to the inflammatory responses of soft tissue due to the microscopic laceration of extensor

common tendon which is attached to the lateral epicondylitis. This theory is still acceptable due to the common reason of lateral epicondylitis. Besides the mentioned reasons, other reasons like soft tissue decay, power deficiency, or muscular imbalance, scar tissue, weak circulation, deteriorative changes following intense or repetitive activities which are beyond the capacity of inflicted tissues can be mentioned [1, 8].

Although about 40-50% tennis player have experienced lateral epicondylitis during their life, less than patients with lateral epicondylitis have been tennis players [9]. The major complaint of these patients is pain in elbow and forearm together with decrease in gripping strength. This pain usually increases with increase in activity. Diagnosis of this infliction is easy and it can be done

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through tests which intensify the pain, test such as touching edge of lateral epicondylitis, resistance against wrist extension, resistance against middle finger extension, inactive flexion of wrist and assessing changes of muscle strength [1,10,11].

Several treatments have been suggested for treatment of lateral epicondylitis. These treatments can be of one intervention or a mixture of several interventions including ultrasound, stretch, strength exercises, steroid injection, Iontophoresis, transverse massage and brace, all of which emphasize on decreasing the inflammation. Lately the use of Kinesio tape as a non-invasive treatment method has been introduced in order to restore the normal function of muscles and joints, to create normal biomechanics of tissue by decreasing the pain and to restore tissue hemostasis in rehabilitation. This method can be used as a dependent treatment approach or as a means to maintain the treatment effects of other methods [12].

The Kinesio tape was first designed by Dr. Kenzo Kase in 1973 in Japan. He believed that Kinesio tape techniques like sports tapes and straps- which help support the muscle and joint- can decrease the motion range and cannot support fascia and in some cases these techniques will restrain the improvement process of affected tissues. Therefore, he decided to produce the kinesiology tape with different principles and methods. In this tape, a specific designed tape is used which can be stretched up to 40% and in contrary to previous tapes, they allow the full range of motion to the body [12,16].

The kinesiology tape has an elastic characteristic and thickness similar to human skin and it is made of fibers with 100% flax and acrylic paste with low sensitivity due to the lack of latex. Thus they can be used for all ages [13]. Since this product is water resistant, it allows the individuals to take shower and to use it for 3 to 5 days [12].

At first due to its elasticity, the Kinesio tape seemed to be useful in soft tissue injuries. But by lapse of time, its other properties were also used in rehabilitation [13].

The Kinesio tape has more than 160 synonyms such as cure tape, elastic tape, kinesio tex tape, kine tape, K-tape, physio tape and etc. [13].

The Kinesio tape has been used for long time by occupational therapist, physiotherapist as well as sport trainers in order to treat sprain, joint instability, soft tissue inflammation, muscular weakness and pain [14] and generally it is divided into two groups of elastic and non-elastic [15].

There are six common methods for using this technique [13] which after appraisal and diagnosis of patient's sickness, one or a mixture of these methods can be used. The corrective methods include 1- mechanical, 2- facial, 3- spatial, 4- ligament-tendon, 5- functional and 6- lymphatic [16].

The success of Kinesio tape relies on two factors: 1- proper assessment of patient's condition in order to use Kinesio tape on the intended tissue, 2- proper application of Kinesio tape technique [16].

While using the Kinesio tape the proper degree of tension is important. If the tension is high, the effect will be gone [12, 16]. Two principles should be taken into account when using Kinesio tape in treatments of muscles. In acute cases as well as muscle strain cases, Kinesio tape is used from distal attachment to proximal attachment for muscle inhibition. And in chronic cases, muscle weakness or when we seek to increase the muscle contraction, the Kinesio tape is used from proximal attachment to distal attachment [16].

Although Kinesio tape is used by athletes and patients with epicondylitis, its exact mechanism is not yet clear. The hypothesis proposed for using Kinesio tape is that it decreases the pressure on muscles, which through affecting the cutaneous mechanoreceptors (effect of neurophysiology) the force deletion is done on soft tissue. The Kinesio tape causes tensional force and mechanical pressure on skin and through this changes skin tension and as a result affects the pressure pain threshold [17].

The other mechanisms of Kinesio tape are as follows: normalization of muscular function (inhibition of hyperactive muscles and stimulation of weak muscles), increase in proprioception by stimulating skin mechanical receptors, increase in vascular and lymphatic flow, correcting joint dysfunction by correction of abnormal muscle tension, raising the skin and providing more space under Kinesio tape [17, 21].

Therefore, the purpose of this study is to review existing scientific evidence on the effect of using Kinesio tape in treatment of lateral epicondylitis.

## 2. Materials & Methods

A literature search was done in google scholar, pubmed, science direct, proquest, medline, advanced google and pedro database. The following keywords were used: Kinesio tape, Elastic tape, Taping technique, Pain, Grip strength, Lateral epicondylitis, and tennis elbow. The in-

**Table 1.** Summary of reviewed articles regarding the effects of kinesi taping in treatment of lateral epicondylitis.

Author / Publishing Year	Number of Study Subjects	Purpose of the Study	Assessed variable	Tools and Methods of Measurement	Conclusion
Vicenzino & his colleagues 2003 (22)	16 patients with chronic epicondylitis participated in this study and they were divided in three categories: treatment, placebo, control.	The initial effect of Kinesio tape on grip strength without pain and pressure pain threshold in individuals with lateral epicondylitis	Grip without pain and pressure pain threshold	Dynamometer & Algometer	The Kinesio tape technique showed significant improvement in grip strength without pain in relation to placebo and control group. The pressure pain threshold was positive but no statistically significant.
Shamsoddini& his colleagues 2006 (23)	30 patients were divided to two groups of Kinesio tape and brace counterforce.	The comparison of the immediate effect of Kinesio tape and brace counterforce in patients with lateral epicondylitis	Study of pain in two conditions of rest, wrist extension and grip strength	visual analogue scale in two dynamometers	There was no significant difference in grip strength between two groups (P=0.06). Regarding the pain intensity, the results indicated that there is a significant difference between the two methods and in both conditions, the mean of the scores in Kinesio tape was higher than two groups of brace counterforce (P=0.004, P=0.001)
Shamsoddini & his colleagues 2008 (24)	25 martial patients participated (16 patients in case group and 9 patients in witness group).	The initial effect of Kinesio tape technique on grip strength of martial individuals with lateral epicondylitis	Pain & grip strength	visual analogue scale in two dynamometers	Kinesio tape technique initially decreases the pain, but it is not immediately effective in increasing grip strength.
Shamsoddini & his colleagues 2010 (25)	15 patients participated in the study and their affected hand was compared to the unaffected one (control group).	The initial effect of Kinesio tape technique on individuals with lateral epicondylitis	Wrist extension strength, grip strength and pain	Dynamometer, visual analogue scale of pain	There was a significant difference in extension grip between the affected arm and the unaffected one. Also, changes in grip strength indicated significant statistical improvement in affected arm in relation to the one. Changes in pain was also positive in the affected arm.
Amro & his colleagues 2010 (26)	34 patients were equally divided to treatment and control group. 1- treatment group: Mulligan techniques (including mobilisation with movement (MWM) and (Kinesio tape ) + common physiotherapy treatments 2- Common physiotherapy treatments	Study of the effect of Mulligan techniques including mobilisation with movement (MWM) and Kinesio tape on patients with lateral epicondylitis	Pain, grip strength and function	Visual analogue scale of pain, dynamometer and Patient-Related Tennis Elbow Evaluation (PRTEE)	The statistical studies indicated significant improvement in both control and treatment group. Furthermore, improvement of pain intensity and maximum of grip strength is significantly higher in treatment group than the control group. This study revealed that combination of Mulligan techniques with common treatments shows better results in epicondylitis treatment in relation to the sole common treatment.
Alphy & his colleagues 2010 (27)	30 patients were divided in two groups: one treatment with Kinesio tape and the other treatment with ultrasound.	Comparison of Kinesio tape and ultrasound therapy on individuals with lateral epicondylitis	Pain intensity and grip strength	Visual analogue scale of pain & dynamometer	The results revealed that the ultrasound has better results in relation to Kinesio tape technique.

Author / Publishing Year	Number of Study Subjects	Purpose of the Study	Assessed variable	Tools and Methods of Measurement	Conclusion
Evans & his colleagues 2012 (28)	20 unaffected patients were divided in two groups: 1-taping with diamond technique 2- taping with Mulligan technique	The initial purpose of this study: investigation of effect of two techniques of taping on grip strength, secondary purpose of the study: comparison of two techniques and determining which one is better.	Grip strength without pain	Dynamometer	Both techniques significantly decreased the grip strength, but there was no significant difference between two methods of Kinesio tape. The author finally suggested that these Kinesio tape methods in individuals with lateral epicondylitis can have positive results and it can be applied together with other therapeutic methods. However, further studies are required to compare these two methods on individuals with lateral epicondylitis (41).
Prabhakar & his colleagues 2013 (29)	40 patients were divided into cyriax physiotherapy and taping technique group.	The comparison of cyriax physiotherapy and Kinesio tape in individuals with lateral epicondylitis	Pain, grip strength and functional activity	Visual analogue scale of pain, dynamometer and patient rated forearm evaluation questionnaire	The results revealed significant improvement in pain, grip strength and functional activity in both treatment groups. However, the comparison between two groups revealed that the cyriax physiotherapy had a significantly improved pain intensity and functional activity in relation to Kinesio tape.
Kachanathu & his colleagues 2013 (30)	45 persons diagnosed with lateral epicondylitis were equally divided into three groups of 15 persons. 1-Forearm band + common physiotherapy treatment 2-Kinesio tape + common physiotherapy treatment 3- Control group (common physiotherapy treatment)	Comparison of forearm band and Kinesio tape in treatment of lateral epicondylitis	Grip strength without pain and functional activity	Dynamometer and patient rated forearm evaluation questionnaire	Group one indicated the maximum improvement, group two was more effective in relation to the group which only had common physiotherapy treatment. The results revealed that applying forearm band significantly increased grip strength and functional activity compared to Kinesio tape and control group.
Shamsoddini & his colleagues 2013 (31)	30 patients participated in the study and the affected arm was compared to the unaffected one (control).	The initial effect of Kinesio tape on individuals with lateral epicondylitis	Pain, grip strength and wrist extension force	Visual analogue scale of pain & dynamometer	There was a significant difference in wrist extension force between two forearms (P=0.03). The changes in grip strength indicated significant improvement in affected hand compared to the unaffected one (P=0.02). While evaluating pain in lateral epicondylitis, it was revealed that the mean of change between the unaffected forearm and the affected one was significant (P=0.001). The results of the study suggested that applying Kinesio tape technique in this study has an effective result on wrist extension power and grip strength of patients with lateral epicondylitis.
Schneider & his colleagues 2013 (31)	14 healthy tennis players participated in this study and they were divided in control group and Kinesio tape group.	The study of effect of Kinesio tape in decreasing muscles tiredness of forearm extensor by maintaining the power of these muscles (tiredness is common in lateral epicondylitis).	Forearm extensor power	MicroFET2 (MF2)	The results revealed that the power significantly decreased in control group in relation to the Kinesio tape group. Therefore, using the Kinesio tape is effective in treatment of patients with lateral epicondylitis because it decreases tiredness of extensor muscles.

clusion criteria were English and Persian articles which were published from 2000 to 2013 and articles which were case report were excluded.

### 3. Results

26 articles including randomized clinical trial, cohort study, case-control study and trial which included healthy population, patients, male and female at any age range were extracted. 11 articles had the inclusion criteria. The summary of review articles are provided in table No. 1 at the end of the article.

### 4. Discussion

In this study, all the relevant articles were reviewed. The result of the study regarding the effect of Kinesio tape on pain intensity indicated that those who used the tape reported less pain [23,27,29,31]. To measure pain intensity, the visual analogue scale was used. In these articles the Kinesio tape was compared to other methods such as brace counterforce, cyriax physiotherapy and ultrasound [23,27,29] and in other three articles the Kinesio tape was compared to control group. In two of the articles, the unaffected hand was considered as control group and one article applied common physiotherapy treatments for the control group [24,25,26].

The result of the study showed that the authors agree about the effect of Kinesio tape on decreasing the pain intensity, but they disagree on the reason for the decrease in pain intensity due to Kinesio tape. This decrease in pain can be explained by taping techniques which through neurophysiologic and biomechanical mechanisms affect the pain. The biomechanical effect is due to the taping method which decreases the lateral epicondylitis tension and consequently the pain decreases. The neurophysiologic taping affects nervous system especially the nervous system for pain perception and inhibits pain by locally changing pain perception in lateral epicondylitis or inhibits the pain by facilitating large afferent fiber input into spinal cord by stimulating endogenous processes [23,24].

The articles that studied grip strength and forearm extensor strength indicated contradictory results. A group of writers found out that Kinesio tape increases grip strength [22,23,26,29,31]. There was no difference in three articles concerning the grip strength [24,27,30], and in one article the grip strength decreased [28]. Three articles studied variable of forearm extensor strength and they three reported its increase and maintenance [25,31,32].

Several hypotheses have been proposed for improvement of grip strength and forearm extensor strength. Since one of the important limiting factors in muscular power is pain and considering that this method of treatment using neurophysiologic and biomechanical mechanisms decreases the pain in lateral epicondylitis, therefore improvement of strength seems logical. On the other hand, the Kinesio tape distributes the stress caused by muscles contraction and through this decreases the pain inhibition and allows the person contract the muscle with more power, however this is not yet proved.

There is also another hypothesis which states that Kinesio tape is effective in treatment of patients having lateral epicondylitis by decreasing muscles weariness and maintaining their strength [23]. In the article which reported that grip strength decreases, all participants were healthy and according to the results obtained they were asked about individuals with lateral epicondylitis. In this article, the author stated that in terms of theory, the Kinesio tape and brace counterforce have logical biomechanical similarity and both decrease the power on lateral epicondylitis [Meyer et al 2002; Walther et al 2002].

Wadsworth et al [1989] [cited in Meyer et al 2002] suggested that there are contradictory results in grip strength while using brace in individuals with and without pathology. Using brace in people with lateral epicondylitis increases grip strength, unloading muscle decreases the pain and the person will have stronger contradiction.

On the contrary, in healthy individuals the brace decreases the strength, because it mechanically limits muscular contradiction. The same results were shown with the healthy individuals. In this study every method which decreased the grip strength was selected as the more effective treatment. Finally, both taping methods decreased the grip strength equally [28].

The articles which studied functional activity all concluded that the Kinesio tape improves the functional activity. This can be attributed to therapeutic effect of Kinesio tape in decrease of pain and improvement of muscle contraction. There is also psychological effect like easiness which can be felt while using Kinesio tape continuously, this is one of the prominent effects of this method which is not observed in other therapeutic interventions [26,29,30].

Considering the results of different studies it can be concluded that there is correlation between pain intensity and pressure pain threshold. When the pain decreases, the pressure pain threshold of nociceptor decreases.

However, Vicenzino assessed variable of pressure pain threshold and the results were positive, but not statistically significant. This can be probably due to the minimum sample size [22].

Due to the differences in measured variables, different methods of performance and various tests, it was difficult to compare the results of studies with each other. On the other hand, the studies only investigated the short term effect of Kinesio tape. However the exact mechanism of Kinesio tape is not yet clear, but it seems that it considerably decreases the pain, improves the grip strength and hand extension and it also improves the function of patient with lateral epicondylitis.

It should be also mentioned that none of the articles reported the ill effects of Kinesio tape, therefore it seems that the Kinesio tape is an inexpensive and noninvasive treatment for alleviating symptoms of lateral epicondylitis. What matters is that the therapist should use a combination of interventions based on symptoms of patients and existing reasons. According to this systematic review, it can be stated that considering the multilateral effects of the Kinesio tape such as mechanical correction, fascia correction, spatial correction, functional correction and psychological effects, it can be considered as a useful method for treatment of this injury.

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