

## Effects of Kinesio Taping with Physical Therapy on Low Back Pain to Improve Functional Mobility: A Literature Review

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### Abstract

The purpose of the critical review is to determine the effect of Kinesio Taping in chronic non-specific low back pain patients and improvement in pain, disability, the activity of daily living. A literature search was performed to locate randomized controlled studies published within the last ten years with the keywords using Low back pain, Kinesio tape, Physical Therapy, Randomized controlled trial. Within the four studies, 191 adult patients with chronic non-specific low back pain participated either in the intervention that includes traditional physical therapy and spinal manipulation treatment with Kinesio Taping or was part of a control (without Kinesio Tape) or placebo group (placebo Kinesio tape). Although increases in muscle strength, endurance, and improvement in pain and disability in all four studies, the results are inconclusive as the effect of Kinesio Tape is too small to be clinically worthwhile.

### Introduction

Low back pain is widespread and one of the most important causes of the limitation in functional movement, primarily for people under 45 years old [1]. It has been predicted that about 70–80% of people suffer from LBP at least once in their lifetime [2]. Chronic low back pain defined as a pain that last more than three

months repeat intermittently during six months. Sometimes the cause of chronic low back pain is not fully understood, but in athletes, it may include traumatic and overuse injury, which causes micro-trauma over a longer time [3].

Chronic low back pains can cause mobility restriction, long-term disability, and thus affect the quality of life, ultimately affecting people's job-related duties (Ryan *et al.*, 2009) [4-6]. Chronic low back pain prognoses are estimated based on minimal studies. So, the chance of being functionally independent with pain-free ROM 12 months after the onset of CLBP is only 42% [7]. This creates an urgent need for different and effective treatment for CLBP [8].

Continuous low back pain creates other complications like decreased mobility and stability, decreased coordination and muscle strength, and proprioceptive changes, which can cause somatic disorder [9]. Muscle response patterns varied according to the loads created due to postural changes (Radebold *et al.*, 2000). CLBP can cause a decrease in daily activities that affects the strength of the paraspinal muscles and makes them weak, and cause more pain [10].

Physical therapists use different treatment approaches to relieve chronic low back pain, among them, Kinesio Taping inhibits muscle mobility according to the direction of muscle fibers and changes the output of motor neurons by activating afferent input from the skin (Morrissey D, 2000, Tobin S, Robinson G, 2000). There are different types of tape, and their application methods are available. NSLBP favors a new approach using Kinesio Taping, which helps support the affected area, relax the muscles, and reduce pain sensation.

The most significant advantage of using Kinesio Tape compared to conventional athletic tape is that it has thin and elastic mechanical properties similar to skin and allows a normal range of motion. Kinesio Tape was initially developed in Japan by Kase and Wallis in 2002 [11]. Kinesio Tape has multiple functions: improvement of muscle function, aligning tissue in the desired position by gathering fascia. It lifts the skin and activates blood and lymph circulation, thus helping to reduce inflammation, pain, and edema. It also stimulates cutaneous mechanoreceptors and deactivates the pain system. Kinesio Tape maintains joint functions by stimulating proprioceptors, correcting the direction of movement, and increasing stability.

Kinesio Taping may work better when used along with different treatment approaches, as Kinesio Taping can help reduce patients' pain. However, it is for a shorter period, as the pain is reduced, patients can participate in other Physical therapy approaches such as stretching, strengthening exercise, and spinal mobilization. So, the purpose is to see how Kinesio Taping can help with or without any other physical therapy treatments on chronic non-specific low back pain.

## Method

A literature review at The College of St. Scholastica Library using the SOLAR database was conducted from July 14, 2018, through July 25, 2018. The keywords were used: Low back pain, Kinesio tape, Physical Therapy, Randomized controlled trial. The articles were selected to meet the following inclusion criteria: those whose low back pain had continued for more than three months. Those who had not undergone lumbar region surgery because of orthopedic problems. Those who did not have a structural malformation

or another musculoskeletal disease. Those whose skin was not sensitive to tapes; those who had not conducted exercises using the muscles of the lumbar spinal area for the past three months; those who had not experienced taping treatment before.

The initial search was done using PICO: P - low back pain, I- Kinesio tape, C - blank, O - reduce pain, seven results were received, but none matched inclusion criteria. When searching in PubMed with the exact keywords and limitations and receiving three search items, none matched inclusion criteria. In SOLAR, with this keyword received 639 search results. After applying limitation: Full Text, published 2008 - 2018, randomized control trial study, utilized intervention: Kinesio tape and physical therapy, low back pain, searched result decreased to 589. However, many of them were on healthy subjects; the initial review was completed based on intervention and finalized four articles. Later, two of the four articles were eliminated as the research was done on healthy subjects. Again, a review was initiated using SOLAR to find articles on the population with low back pain. Ended search having four articles from SOLAR with all inclusion criteria.

## Critical Reviews

Bae, Lee, Oh, Kim (2013) [12] conducted a randomized controlled trial study to see the effect of Kinesio taping on chronic low back pain patients and the changes in their postural control and cerebral cortex. Patients with constant low back pain VAS > 6 for more than three months were recruited (n = 20). Criteria for exclusion were lumbar post-op, structural malformation, any other musculoskeletal disease, skin sensitivity to Kinesio tape, and with the experience of lower back exercise and Kinesio taping. Subjects with all inclusion criteria were randomly and equally distributed to the control group (n=10) and experimental group (n=10). There were no apparent differences in demographic data (age, sex, height, weight, BMI, and pain duration).

Both control and experimental groups were treated for three-time per week for a total of twelve weeks. Both groups were given standard pain therapy, including a hot pack, ultrasound, and TENS on L1-2 and L4-5 areas. Placebo tape (inelastic "I" strip) was applied to patients in the control group, transversely to the lumbar area with maximum pain. The same Physical therapist applied Kinesio taping to the experimental group on the painful lumbar area in a star manner. Surface EMG (BTS Pocket EMG, BTS S. P.A., Milan, Italy) was used to monitor trunk muscle contradiction to check anticipatory postural adjustment. The electrode was placed to the anterior deltoid (DA), the transversus abdominis (TrA), the external oblique (EO).

Electromyography was used to evaluate anticipatory postural control, and movement-related cortical potential (MRCP) was assessed using electroencephalography. MRCP was divided into readiness potential (RP), - 600ms to -500ms, motor potential (MP) at -100ms to 0ms, and movement monitoring potential (MMP) at 0ms to 1s. Clinical evaluation was done using the visual analog scale and Oswestry disability index. Cerebral cortex potential changes were measured using QEEG-8 by pacing active electrodes F3, Fz, F4, C3, Cz, C4 on cortex and ground electrodes, and reference electrodes were attached to mastoids. Brain signals were measured prior to the attachment of tape and 12 weeks after the attachment. SPSS 12.0 for windows was used for statistical analysis. After taping, paired t-test was used to analyze changes in statistical analysis within each group, and an independent t-test was used for changes between the groups.

Results were given in table form and were clearly stated; after the experiments, a significant difference was found in the transverse abdominal of the experimental group. There was a significant decrease in MRCP, and particularly in the experimental group. As per the clinical evaluation, VAS and ODI scores were significantly decreased in patients with Kinesio taping.

The most significant difference was observed in the daily functional activities of the experimental group. As per the results, Kinesio taping can help patients with lower back pain to be used for patients with the same inclusion criteria.

Low back pain gets worst; it affects back muscles' strength, endurance, and flexibility. So, patients' level of participation in daily activity decrease, and quality of life is reduced. In chronic lower back patients, the muscle coordination is disturbed, and they adopt a different cerebral cortical change due to pain. This results in a disturbance of anticipatory postural adjustment. Applying Kinesio taping in chronic low back patients affects anticipatory postural adjustment.

The limitation of the study is the lack of explanation of use for different types of Kinesio Taping. They have not considered a proper method that should be used for taping. Kinesio tape comes in different textures and elastic powers. So, not all the Kinesio tape works the same; its effects also vary according to the direction and tension placed on the Kinesio tape. Proper assessment should also be done to decide the method and type of Kinesio tape. They also had not clarified the cause of low back pain in patients. These questions stimulate further studies on a patient with a particular diagnosis of low back pain and the method and type of Kinesio tape application.

Kachanathu, Alenazi, Seif, Hafez, Alroumim 2014 [13] conducted randomized controlled trial study to observe the effect of Kinesio taping (KT) compared with traditional physical therapy management of nonspecific low back pain (NSLBP). NSLBP is defined as pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds without any specific pathology and radiating pain. Patients having NSLBP at least for the last three months and without any other pathological problems were recruited (n=40). There was no apparent difference in demographic data (age, sex, height, weight, BMI, and pain duration).

The study was conducted in the outpatient physical therapy department of Cairo university hospital. A total of 40 patients were diagnosed with NSLBP by an orthopedic physician male (n=30), female (n=10). Patients were randomly assigned to two different groups. Group 1 (n=20) received convention therapy with Kinesio taping, whereas group 2 (n=20) received conventional therapy without Kinesio taping. Both groups were treated for three sessions per week over four weeks. Conventional therapy includes stretching exercises for the back, hamstring, and iliopsoas muscles. For Kinesio taping to I tapes was applied to start from the origin of the lumbar erector spinal muscle to its insertion.

Outcome assessment for patient's activity of daily living (ADL) was done using Roland- Morris Disability Questionnaire (RMDQ), visual analog scale (VAS) for pain, and the modified Schober's test for a range of motion of trunk flexion and extension. Unpaired t-test was used for statistical analysis to compare the measure of both groups. Significant differences were found in both groups pre and post-treatment regarding

ADL, pain, and trunk flexion, and extension ROM ( $p < 0.05$ ). However, there were no significant differences noted between the two groups ( $p > 0.05$ ).

Results were given in table form and were clearly stated. As per result, using Kinesio taping to one group of patients did not significantly differ from the group without Kinesio taping. According to the results, this finding can also help other patients with NSLBP. So, with or without Kinesio taping, patients can get better results with proper conventional therapy treatment regarding ADL, ROM, and pain.

Abnormal prolonged or short stress on the lumbar and pelvic region caused mechanical low back pain. Muscle imbalance can occur due to repetitive injury and undue stress. That makes muscle hypertonic, which leads to ischemia and reduced blood flow, which increases pain. So, it is essential to include stretching and strengthening exercises in the LBP treatment protocol. Kinesio tape lifts skin, creating wider space that helps improve blood circulation and drainage of lymphatic fluid, thus helping to reduce pain and increasing ROM.

The strength of the study includes a single-blinded study and randomization in patients' allocation. The limitation of the study includes a lack of explanation of the type of Kinesio tape used as there are different types of Kinesio tapes with different functions. Other, no attention was given to exclusion criteria for patients. Further study should be done using only Kinesio tape without any conventional therapy. A proper type of Kinesio tape and application method may help patients reduce the pain that ultimately encourages them to take part in an exercise program.

Kamali, Sinaei, Taherkhani 2017 [14] conducted a randomized controlled trial study to compare spinal manipulation with and without Kinesio taping to treat chronic low back pain. Semi-elite athletes ( $n=42$ ) aged 20-45 with chronic low back pain were recruited by simple sampling. Subjects were soccer ( $n=25$ ), basketball ( $n=13$ ), and volleyball ( $n=4$ ). Exclusion criteria were history of neurological, rheumatoid, and psychological diseases, sciatica, disc herniation, spinal canal stenosis, spondylolisthesis. Subjects were also excluded if they had previous lumbar surgery, with contraindication to spinal mobilization, and who had done physical therapy during the last three months.

Patients were randomly divided into two groups of 21 subjects after obtaining written consent. One group ( $n=21$ ) received only spinal manipulation, and another group ( $n=21$ ) received spinal manipulation plus twenty-four hours of Kinesio Taping. Patients have received only one spinal manipulation in a day. Kinesio Tape was applied in Y-shaped, or star shapes as needed after shaving and cleaning the patient's back. Kinesio Tape was applied immediately after spinal manipulation by the same physical therapist and kept for 24 hours on the patient's body.

Assessments were completed at baseline and immediately, one day, one week, and one month after the interventions for pain using a numerical rating scale (NRS) (Jensen *et al.*, 1999) of 0- 100 where 0 is no and 100 indicated most perceived pain. Functional disability level and trunk muscles endurance were performed at the exact times, except immediately after. Oswestry Pain and Disability Index (ODI) (Fairbank and Pynsent, 2000) was used to assess functional disability using a questionnaire with a maximum score of 50. Isometric endurance of trunk flexors and trunk extensors was assessed by McQuade (McGill *et al.* 1999).

The strength of the study includes a single-blinded study and randomization in patients allocation. Patients were aware of their treatment; a different physical therapist performed measurements and interventions. The assessor evaluated the outcome measures while patients were dressed so that the application of KT could not be observed. One-sample Kolmogorov-Smirnov test was used to test the normality of data. Two independent t-tests were used to compare the demographic and baseline characteristics of the participants in two groups. Inter-group and intra-group comparisons in different follow-ups were done using ANOVA.

Outcomes of this study showed that pain intensity (NRS) and disability level (ODI) decreased significantly ( $P < 0.05$ ), and endurance of trunk flexors and extensors increased significantly ( $p < 0.05$ ). So, no significant difference favored a single group. As per results, it can be said that Kinesio Tape might not add any extra positive effect on spinal mobilization in treating athletes with chronic low back pain.

The limitation of the study includes the recruitment of only young subjects with chronic low back pain. So, these results may not be generalizable to other age groups with different types of back pain. Further study can be done using only Kinesio Tape in similar types of pain and subjects to check the efficacy of Kinesio Tape.

## Discussion

In an individual with NSLBP, the focus was on stretching and strengthening muscles only. Through the ensuing years, the types of traditional physical therapy treatment have changed. The new approach of using Kinesio Taping to support affected areas, relax muscles and reduce pain sensation in NSLBP has been introduced. The effectiveness of Kinesio Taping can help patients to become pain-free and motivate them to participate in traditional physical therapy treatment and spinal mobilization.

This research paper's purpose was to critically review the literature to determine the effects of Kinesio Taping with or without traditional physical therapy treatment in patients with chronic and non-specific low back pain. Only a few studies have observed the effects of Kinesio Taping in patients with NSLBP and improvement in pain, disability, and activities of daily living. However, four studies, which have all been published within the last six years, were ultimately identified as RCTs that observed the efficacy of Kinesio Taping on NSLBP and its effects on muscle strength and endurance.

All four studies utilized feasible, age, occupation, and functional independence appropriate intervention for pain relief, increased muscle strength, and endurance using Kinesio Taping. No report of any injuries or significant adverse events was noted as a result of the intervention. It can be said that all these intervention programs that were utilized in the RCTs would be able to be implemented under identical conditions as the study safely.

Not all four studies found statistically significant improvement in pain, disability, muscle strength, and endurance. One study [15] that utilized parametric statistics to compare the pre-intervention and post-intervention findings of the experimental group with the control group showed a significant reduction in pain and positively affected their anticipatory postural control. That shows that the result should also be considered clinically significant.

However, the other three studies did not find any significant differences in pre-intervention and post-intervention groups. The effect of Kinesio Taping in reducing disability and pain in low back pain patients was too small [16]. At the beginning of the study, they found significant improvement in pain and disability after one week, but there were no differences between the control and experimental groups after four weeks. So, this result is not clinically worthwhile.

In the study comparing traditional physical therapy with Kinesio Taping [13], no significant differences were noted between the group with combined treatment of traditional therapy and Kinesio taping and the group with only traditional therapy. Moreover, in the study [14], no significant difference was seen in patients who received spinal manipulation with Kinesio Taping and patients who received only spinal manipulation. In both studies, the effects of using Kinesio Taping were minimal regarding improvement in pain, the strength of muscles, ROM, and disability in the experimental group, but both groups had the same outcome at the end of the study. So, these results were also not clinically significant.

Though the effects of Kinesio Taping are minimal regarding pain, ROM, strength as this is a very cheap and quick treatment option; it is advisable to use it in patients with the same condition. Even short-term pain relief motivates patients, and they can participate in an exercise program without any apprehension. Patients feel confident with their treatment, and all this positively affects to get faster recovery.

The limitation of all four studies includes none of the four studies that have described the type of Kinesio Taping used. There are different types of Kinesio Tapes available in the market, and they have unique characteristics and functions. Another characteristic is their color; sometimes, changing the color of the Kinesio Tape can improve pain in patients. Some of the studies, RCTs were done using Kinesio Taping along with other forms of therapy, so the short-term results of Kinesio Taping get overlapped by long-term effects of other traditional physical therapy treatment. So, it is hard to identify the actual benefit of Kinesio Taping, which raises questions for future studies, such as: using only Kinesio Taping in NSLBP patients, changing the color of Kinesio Taping and seeing the difference on patients with NSLBP. It can yield more reliable results.

## Conclusion

Chronic non-specific low back pain can reduce strength and flexibility of muscles, affect proprioception, and decrease stability and mobility, thus producing postural abnormality, which increases pain. So, applying Kinesio Taping can help for anticipatory postural control and reduce pain. The critical review concludes that Kinesio Taping can help improve pain, ROM, muscle strength, and disability for a small amount of time. However, as it also helps postural control, it is advisable to include Kinesio Taping in the NSLBP intervention program. A physical therapist should always review new articles, determine the validity, and apply the NSLBP patient's intervention program results.

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## Conflict of Interest Statement

None.

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