

# Comparison between Kinesio Taping and a Traditional Physical Therapy Program in Treatment of Nonspecific Low Back Pain

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**Abstract.** [Purpose] Nonspecific low back pain (NSLBP) is a very common but largely self-limiting condition. Several types of tape and their associated application methods are available for different conditions. The aim of the present study was to observe the effect of Kinesio taping (KT) compared with traditional management of NSLBP. [Subjects and Methods] Forty male and female patients with a mean age of  $34.8 \pm 7.54$  years were randomly divided into two groups; group 1 ( $n=20$ ) which underwent conventional physical therapy with KT, and group 2 ( $n=20$ ), which underwent only conventional physical therapy. The intervention sessions for both groups were three times per week for four weeks. Outcomes were assessed for activities of daily living (ADL) using the Roland-Morris Disability Questionnaire, pain severity using a visual analogue scale, and ranges of motion (ROMs) of trunk flexion and extension using the modified Schober's test. [Results] Significant differences in measures of pain, ADL, and trunk flexion and extension ROMs were observed post intervention within each group. In comparison, there were no significant differences in measures of pain, ADL, and trunk flexion and extension ROMs post intervention between groups. [Conclusion] A physical therapy program involving strengthening exercises for abdominal muscles and stretching exercises for back, hamstring, and iliopsoas muscles with or without Kinesio taping was beneficial in the treatment of chronic low back pain.

**Key words:** Back pain, Taping, Exercises

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## INTRODUCTION

Nonspecific low back pain (NSLBP) is a widespread problem with major social and economical consequences<sup>1, 2)</sup>. NSLBP comprises 85 to 90% of low back pain diagnoses and is defined as low back pain not attributable to a recognizable, known specific pathology, e.g., infection, tumor, osteoporosis, or fracture<sup>1, 4, 5)</sup>. The majority of patients with low back pain are successfully treated in primary care; approximately 10 to 15% will develop chronic (more than three months) symptoms<sup>6)</sup>. In the general population, the prevalence of LBP ranges from 12 to 33%, the one-year prevalence ranges from 22 to 65%, and the lifetime prevalence ranges from 11 to 84%<sup>7)</sup>.

NSLBP is a mechanical pain of musculoskeletal origin in which symptoms vary with the nature of physical ac-

tivities<sup>8)</sup>. NSLBP patients represent approximately 85% of LBP patients presenting to primary care facilities<sup>9)</sup>. NSLBP manifests as pain, muscle tension, or stiffness that is localized below the costal margin and above the inferior gluteal folds and is not attributed to a specific pathology with or without leg pain involvement<sup>10, 11)</sup>. LBP is considered to be a largely self-limiting health problem<sup>12)</sup>. It is estimated that 80 to 90% of patients with acute LBP disorders recover within six weeks<sup>13-15)</sup>. However, 10 to 20% will develop chronic LBP (CLBP)<sup>14, 10, 11)</sup>. Approximately 70 to 80% of health care and social costs are attributed to the 10 to 20% of patients with CLBP<sup>14, 10-22)</sup>. Once LBP becomes chronic, it can be a significant source of long-term disability and absence from work and consequently represents a high socioeconomic burden on health-care systems in developed countries<sup>4, 20, 23)</sup>.

Nonspecific chronic low back pain (NSCLBP) limits activity in individuals younger than 45 years of age in industrialized countries and is considered to be one of the most common reasons for individuals to consult a physician<sup>20)</sup>. In general, the aims of conservative treatment for LBP are to reduce pain, improve activities of daily living (ADL), and to teach patients how to cope with pain<sup>15)</sup>.

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Commonly prescribed treatments for NSCLBP such as acupuncture, traction, transcutaneous electrical nerve stimulation, facet injections, laser therapy, massage, therapeutic ultrasound, and lumbar supports have little or no evidence to support their use<sup>24)</sup>. None of the commonly used interventions can truly offer a solution to the problem of NSCLBP. In most patients, reductions in the number of CLBP-related complaints are minimal while pain continues unabated<sup>1, 25, 26)</sup>.

Several types of tape and their associated application methods are available, with different underlying philosophies regarding their modes of action. A new approach for the treatment of NSCLBP is to support the affected area, relax the muscles, and reduce pain sensation and is referred to as Kinesio taping (KT). Unlike conventional athletic tape, Kinesio tape is thin and has elastic mechanical properties, similar to the skin, to allow a normal range of motion. Kinesio tape was originally developed in Japan by Kase and Wallis<sup>27)</sup> and its use has recently increased<sup>28)</sup>. It was observed that KT has multiple functions: 1) improvement of muscle function; 2) gathering fascia to align tissue in the desired position; 3) activation of the circulation (blood and lymph) by lifting the skin over areas of inflammation, pain and edema; 4) deactivation of the pain system by stimulating cutaneous mechanoreceptors; 5) supporting the function of the joints by stimulating proprioceptors, correcting the direction of movement and increasing stability; and 6) segmental influences<sup>28, 29)</sup>. The aim of the present study was to compare the effects of Kinesio taping and traditional treatment of nonspecific chronic low back pain.

## SUBJECTS AND METHODS

The present study was conducted in an outpatient physical therapy clinic in Cairo university hospitals. A total 40 patients with NSCLBP diagnosed by orthopedic physicians were referred to the outpatient physical therapy clinic (30 male and 10 female) with a mean age of  $34.8 \pm 7.54$  years, mean weight of  $80.25 \pm 15.88$  kg, and mean height of  $168.7 \pm 8.6$  cm and randomly divided into two groups. The inclusion criterion for NSCLBP was a duration of at least three months with no other pathological problems. The study design was a randomized, single-blinded clinical trial with a pre- and post-test groups design. This study was reviewed and approved by the ethical committee of King Saud University. Written consent was obtained from the participants before starting the study.

Group 1 (n=20) underwent conventional physical therapy with Kinesio taping (KT), whereas group 2 (n=20) underwent conventional physical therapy without KT. The conventional physical therapy management consisted of stretching exercises for the back, iliopsoas, and hamstring muscles and strengthening exercises for the abdominal muscles. Three sets of stretching exercises, each involving a 30-sec hold and 30-sec of rest repeated three times, were performed in three sessions per week over four weeks. One set of strengthening exercises, consisting of 10 repetitions with a 5-sec hold, was performed in three sessions per week over four weeks.

The KT technique: Curetape (TapeConcept Ltd., Larna-ca, Cyprus) was used in the present study. The two I-Tapes were applied from the origin of the lumbar erector spinae (iliocostalis lumborum) to its insertion. The area to be treated was clean, and free of hair, and the tape was measured while the lumbar spine was flexed to the maximum. In the case of flexion disturbances, the patient was able to support himself/herself during flexion. The first 4 cm to 5 cm of tape was carefully removed from its paper backing. The base of the tape was applied to the sacrum in the neutral position. The patient was asked to perform maximum flexion of the spine, and the paper backing of the tape was removed, except for the final 4 cm to 5 cm; the tape was then used on one side paravertebrally in the direction of the cranium under slight traction. Finally, the final 4 cm to 5 cm of the tape was applied without traction. The same procedure was then applied to the other side. The tape was rubbed by hand several times to warm the adhesive film to achieve adhesion<sup>29)</sup>.

The intervention sessions for both groups were three times per week for four weeks. Outcomes of interventions were assessed for ADL using the Roland-Morris Disability Questionnaire (RMDQ)<sup>30, 31)</sup>, pain severity using a visual analogue scale (VAS)<sup>32)</sup>, and ranges of motion (ROMs) of trunk flexion and extension using the modified Schober's test<sup>33)</sup>.

## RESULTS

Statistical analysis was performed using SPSS for windows version 16, SPSS Inc., Chicago, IL, USA. Means, SDs, t-values and p values were determined from the collected data. The unpaired t-test was used to compare measures of both groups.  $p < 0.05$  was considered to be statistically significant for all analyses.

There were significant differences in pre- and post-intervention measures of pain, ADL, and trunk flexion and extension ROMs in each group ( $p < 0.05$ ) (Table 1). However, comparison between groups showed no significant differences ( $p > 0.05$ ) in pre- and post-intervention measures of study outcomes such as pain (0.571), ADL (0.671), flexion (0.538), and extension (0.765).

## DISCUSSION

The aim of this study was to compare physical therapy exercise interventions and use of KT in the treatment of CLBP using the changes in clinical outcome (pain, disability) and physical function (range of motion, strength).

Mechanical LBP is due to abnormal short or prolonged stresses that affect the muscular components of the lumbar and pelvic regions<sup>34)</sup>. Muscle imbalances of the lumbopelvic region, as a result of repetitive injury or physical stress, may contribute to the lengthening and weakening of the phasic muscles, while the postural muscles (antigravity) become tight and overactive<sup>35)</sup>. Hypertonic postural muscles can lead to ischemia and reduced blood circulation, further aggravating pain<sup>35)</sup>. This imbalance modifies body movement, putting strain on muscles, tendons, ligaments, and joints; consequently, the end result is often LBP<sup>36)</sup>.

It has been suggested that a normal lumbar lordosis

**Table 1.** Pre-and Post-intervention scores of pain (VAS) and activities of daily living (RMDQ) and ROMs of trunk flexion and extension

Study groups	Pain		RMDQ		Flexion (cm)		Extension (cm)	
	Mean± SD		Mean± SD		Mean± SD		Mean± SD	
	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
Group 1	6.2±1.4†	6±1.8*	10.3±3.21	10.8±5*	6±1.1	6.3±1.1*	1.4±0.6	1.4±0.5*
Group 2	2.9±1.4	3.7±2	4.7±2.9	7±5.5	6.4±1.2	6.6±1	1.7±0.6	1.63±0.4

Group 1, conventional PT + Kinesio taping; Group 2, conventional PT only. \*within-group comparison ( $p<0.05$ ). †Between-group comparison ( $p>0.05$ ).

protects the posterior spinal structures from excess strain and acts as a shock absorber during sudden applied vertical forces<sup>37, 38)</sup>. Therapeutic exercise programs therefore include stretching of tight muscles, and strengthening of weak muscles, thus restoring muscle balance, strength, and flexibility.

There was a significant difference in both groups. Group 1, there was improvement in pain, ADL, and trunk flexion and extension ROMs between before and after intervention, as exercises can be useful for (1) improving impairments in function, including reduced back flexibility, strength, and cardiovascular endurance; (2) reducing back pain intensity when performed regularly; and (3) reducing back pain-related disability because it may be used as a tool to lessen excessive fear and concerns about back pain and to alter stifling pain attitudes and beliefs.

In group 2, there was improvement in pain, ADL, and trunk flexion and extension ROMs between before and after the intervention, as the flexibility of the tape results in the skin being lifted (convulsion), which creates a wider space between the skin and the muscle, leading to improvement of blood circulation and drainage of lymphatic fluids in the taped area and dramatically decreased pain and improved ROMs and ADL.

Chronic nonspecific low back pain is a significant health condition with high prevalence worldwide and is associated with enormous costs to society. Clinical practice guidelines show that many interventions are available to treat patients with chronic low back pain, but the vast majority of these interventions have a modest effect in reducing pain and disability. An intervention that has been widespread in recent years is the use of elastic bandages called Kinesio taping<sup>38)</sup>. Kinesio tape is a more elastic tape that does not restrict movement and can be stretched up to 120% to 140% of its original length compared with conventional tape, allowing a full ROM. In recent years, KT has been commonly used in the field of physical therapy, orthopedics, and sports medicine<sup>39)</sup>.

There has been a recent study, conducted by Paoloni et al., that investigated the effect of a combination of exercise and KT on pain and ADL in patients with CLBP<sup>40)</sup>. Our findings in terms of reducing LBP were consistent with the results of Paoloni et al., who observed a highly significant reduction in pain, measured using a VAS, after four weeks of treatment with KT in conjunction with exercise. Although the mechanism through which KT acts on musculoskeletal conditions is not yet clear, it is hypothesized that KT applies pressure to the skin or stretches the skin and that

this external load may stimulate cutaneous mechanoreceptors (large myelinated fibers) and thus inhibit pain transmission according to the gate control theory<sup>28, 29)</sup>. Melzack and Wall proposed the gate control theory, which posits that the spinal cord contains a neurological "gate" that either blocks pain signals or allows them to continue on to the brain<sup>41)</sup>.

Contrary to the study by Paoloni et al., we observed a highly significant reduction in disability, measured using the RMDQ, in the KT group. This reduction in disability could be attributed to the younger age of the subjects in the KT group (34.8 years) in our study when compared with the age of the subjects (62 years) in the studies of Paoloni et al<sup>28, 29)</sup>. An association between proprioceptive deficits and LBP has been reported<sup>42–45)</sup>. Previous studies have suggested that KT may enhance proprioceptive afferent feedback<sup>28, 29, 46, 47)</sup>. Improved trunk ROM may be attributed to an increased recruitment in the motor units of the lumbar erector spinae muscles to perform the activity due to increased proprioceptive stimulations. Proprioception could be enhanced through increased cutaneous feedback supplied by KT. Applying pressure and stretching the skin at the extremes of motion, similar to joint mechanoreceptors, can stimulate cutaneous mechanoreceptors and signal information of joint movement or joint position<sup>48, 49)</sup>. When applied to CLBP patients, KT leads to pain relief and lumbar muscle function normalization after application, although these effects persisted over a short period<sup>50)</sup>.

A physical therapy exercise program that involves stretching of the back, hamstring, and iliopsoas muscles and strengthening of the abdominal muscles combined with use of KT may be effective in the treatment of NSCLBP in terms of relieving LBP, increasing the ranges of pain-free active trunk flexion and extension, and improving ADL<sup>51)</sup>.

Comparison between the two groups revealed that there were no significant differences in pain, ADL, and ROM of trunk flexion and extension.

A physical therapy exercise program that involves stretching of the back, hamstring, and iliopsoas muscles with KT or without KT may be effective in the treatment of NSCLBP in terms of relieving LBP, increasing the ranges of pain-free active trunk flexion and extension, and improving ADL.

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