

Kinesio Taping for the Treatment of Mechanical Low Back Pain

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Abstract: Low back pain is considered a common problem and can result in reducing daily activities. A total of 20 patients with chronic low back pain were included in the present study. The age of the subjects ranged from 25 to 45 years with a mean age 34.45 ± 7.45 years. Patients attended physical therapy sessions three times per week for four weeks which included stretching exercises for back, hamstring and iliopsoas muscles and strengthening exercises for abdominal muscles using kinesio taping. Outcome measures were activities of daily living measured using Roland-Morris Disability Questionnaire, pain severity using a visual analogue scale and range of motion of trunk flexion and extension using the modified Schober's test. There were significant differences in measures of pain severity ($P=0.0001$), activities of daily living ($P=0.0001$), trunk flexion ($P=0.037$) and trunk extension (0.001). A physical therapy program involving strengthening exercises for abdominal muscles and stretching exercises for back, hamstring and iliopsoas muscles using kinesio taping was beneficial in the treatment of chronic low back pain.

Key words: Back Pain Syndromes • Taping • Mechanical Back Pain • Nonspecific Low Back Pain
• Strengthening Exercises • Stretching

INTRODUCTION

Low back pain (LBP) is one of the most common musculoskeletal disorders, up to 80% of individuals reporting LBP at some point in their life [1-4]. In the general population, the prevalence of LBP ranges from 12% to 33%, one-year prevalence ranges from 22% to 65% and lifetime prevalence ranges from 11% to 84% [5]. In the Kingdom of Saudi Arabia, back pain is relatively common, although less common than in some industrialized countries. The prevalence of back pain in the Al-Qaseem region of Saudi Arabia reached to approximately 18.8% [6]. Another study found the prevalence of back pain among Saudi school workers in the city of Jeddah, Saudi Arabia was 26.2% [7].

Nonspecific LBP (NSLBP) is a mechanical pain of musculoskeletal origin in which symptoms vary with the nature of physical activities [8]. NSLBP patients represent approximately 85% of LBP patients presenting to primary care facilities [9]. NSLBP manifests as pain, muscle tension or stiffness that is localized below the costal margin and above the inferior glutei folds and is not attributed to a specific pathology with or without leg pain involvement [10, 11]. LBP is considered to be a largely self-limiting health problem [12]. It is estimated that 80 to 90% of patients with acute LBP disorders recover within six weeks [13- 15]. However, 10 to 20% will develop chronic LBP (CLBP) [14, 16, 17]. Approximately 70 to 80% of health care and social costs are attributed to the 10 to 20% of patients with CLBP [14, 18-22]. Once LBP

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becomes chronic, it can be a significant source of long-term disability and absence from work and consequently, represents a high socioeconomic burden to health care systems in developed countries [4, 20, 23].

Nonspecific chronic LBP (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 [23]. In general, the aims of conservative treatment for LBP are to reduce pain, to improve activities of daily living (ADL) and to teach patients how to cope with pain [15].

Commonly prescribed treatments for NSCLBP such as acupuncture, traction, transcutaneous electrical nerve stimulation, facet injections, laser therapy, massage, prolotherapy, therapeutic ultrasound and lumbar supports, have little or no evidence to support their use [24]. 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 [25- 27].

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 skin to allow normal range of motion. Kinesio tape was originally developed in Japan by Kase and Wallis [28] and its use has recently increased [29]. It was hypothesized 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 [29, 30].

The aim of the present study was to determine the effect of kinesiotaping in the treatment of non specific chronic low back pain (NSCLBP).

MATERIALS AND METHODS

Setting: The present study was conducted in physiotherapy department of the National Guard Comprehensive Specialized Clinic in Riyadh, Saudi Arabia.

Subjects: Twenty patients (16 men and 4 women) of age between 25 and 45 years with NSCLBP, a history of LBP for at least three months duration with no other pathological problems were included for the study.

Study Design: Study was a randomized, single-blinded clinical trial with pretest and post-test group design. Subjects were assigned to the treatment of physical therapy and KT and outcome measures were recorded before and after four weeks of treatment.

Instruments:

- The Roland Morris Disability Questionnaire (RMDQ) is a reliable and valid instrument for assessing LBP disability [31 and 32]. The RMDQ consists of 24 items from the Sickness Impact Profile, adapted for LBP. There are no specific subscales. The questionnaire was scored by summing the number of 'yes' answers, varying from 0 (no disabilities) to 24 (severe disabilities).
- A visual analogue scale (VAS) was used to measure pain intensity on a continuous scale [33]. It consists of straight line of 100 mm length; 100 mm represents 'worst pain' whereas 0 mm represents 'no pain'.
- The modified Schober's test was used to measure pain-free active trunk flexion and extension ROM [34]. The modified Schober test was performed with the subject standing erect, knees extended, arms relaxed at the sides and body weight centered. Marks on the skin were made using a pen. The first mark was made at the lumbosacral junction, as indicated by the posterior superior iliac spines; a second mark was made 10 cm above and a third mark was made 5 cm below the lumbosacral junction. The subject was then asked to bend forward as far as possible until the onset of the pain and the new distance between the second and third marks was measured. Similarly, the distance between the superior and inferior marks was measured as the subject extended the spine as far as possible. The initial length (15 cm) was subtracted from the final length of trunk flexion to obtain the extent of trunk flexion, while the final length of the trunk extension was subtracted from the initial length (15 cm) to obtain the extent of trunk extension.

Treatment Procedure: Patients diagnosed with NSCLBP by orthopedic and family medicine physicians were referred to the physiotherapy departments of National Guard Comprehensive Specialized Clinics in Riyadh.

Female patients were assessed and treated by female physiotherapists according to the procedure and protocol of the present study.

Patients performed stretching exercises for back, iliopsoas and hamstring muscles and strengthening exercises for abdominal muscles using Kinesiotaping. Three sets of Stretching exercises, each involving 30 seconds hold and a 30 seconds rest repeated for three times given three sessions per week over four weeks. One set of strengthening exercises, were performed consisting of 10 repetitions with 5 seconds hold, for three sessions per week over four weeks.

Pain severity, ADL and ROM of trunk flexion and extension were measured before and after four weeks of treatment.

Kinesiotaping (KT) Technique: Cure-Tape (Tape Concept Ltd, 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 cleaned, 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 a maximum flexion of the spine and the paper backing of the tape was removed, except for the final 4 cm to 5 cm and the tape was 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 [30].

Data Analysis: Statistical analysis was performed using SPSS version 16 (IBM Corporation, USA) for Windows (Microsoft Corporation, USA). The values of minimum scores, maximum scores, mean, SD, t- value and P value were determined for the collected data. One-sample paired *t* test was used to compare measures before and following four weeks of treatment. $P < 0.05$ was considered to be statistically significant for all analyses.

RESULTS

A total of 20 patients (16 men and four women) received physical therapy exercises using KT. There were significant differences in measures of pain, ADL and trunk flexion and extension ROM before and after treatment ($P < 0.05$).

Table 1: Pre- and post-treatment scores of Pain (VAS) and activities of daily life (RMDQ)

	VAS		RMDQ	
	Pre	Post	Pre	Post
Minimum	4.10	0.70	5	1
Maximum	8.90	5.50	16	10
Mean	6.22	2.87	10.35	4.65
SD	1.35	1.43	3.18	2.89
t value	12.669		9.738	
P value	0.0001		0.0001	

RMDQ Roland-Morris Disability Questionnaire; VAS Visual analogue scale

Table 2: pre- and post-treatment values of Range of motion of trunk flexion and extension

	Modified Schober's Test			
	Flexion		Extension	
	Pre	Post	Pre	Post
Minimum	4.20	4.80	0.50	0.60
Maximum	8.10	8.80	2.60	2.60
Mean	6.06	6.43	1.44	1.69
SD	1.1	1.15	0.64	0.62
t value	2.238		4.073	
P value	0.037		0.001	

Pre -pretreatment; Post-post-treatment after 4-weeks

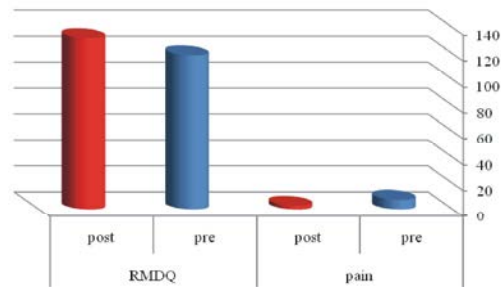


Fig. 1: Pain and activities of daily life pre- and post-treatment. Pre -Pretreatment; Post- post-treatment; RMDQ Roland-Morris Disability Questionnaire scores, VAS Visual analogue scale There was also significant improvement in trunk flexion and trunk extension.

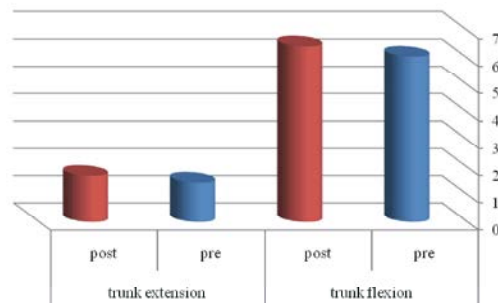


Fig. 2: Range of motion of trunk flexion and extension pre- and post-treatment. Pre- Pretreatment; post- Post-treatment after 4 week

There was significant improvement in pain severity on VAS and RMDQ scores.

DISCUSSION

LBP is a major cause of disability in industrialized Western countries. LBP is the second most common reason for individuals to seek treatment from a physician [17, 35 and 36]. The majority of new episodes of LBP are clinically attributed to a mechanical origin [37] and the first episode of LBP typically occurs in individuals between 25 and 55 years of age [38]. The aim of the present study was to investigate the effects of physical therapy exercises and KT in the treatment of NSCLBP in terms of LBP, pain-free active ROM and ADL in patients with NSCLBP. The physical therapy exercises included stretching exercises of the back, iliopsoas and hamstring and strengthening exercises of abdominal muscles using Kinesio taping (KT).

For CLBP syndrome, exercise can be useful in a) improving back flexibility, strength and cardiovascular endurance ;b) reducing back pain intensity when it is performed regularly; c) reducing back pain-related disability in turn it may be used as a tool to mitigate excessive fear and concerns regarding back pain and alter stifling pain attitudes and beliefs [39].

Mechanical LBP is due to abnormal short or prolonged stresses that affect the muscular components of the lumbar and pelvic regions [40]. 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 [41]. Hypertonic postural muscles can lead to ischemia and reduced blood circulation, further aggravating pain [41]. This imbalance modifies body movement, putting strain on muscles, tendons, ligaments and joints; consequently, the end result is often LBP [42].

It has been suggested that a normal lumbar lordosis protects the posterior spinal structures from excess strain and acts as a shock absorber during sudden applied vertical forces [43, 44]. Therapeutic exercise programs therefore, include stretching tight muscles and strengthening weak muscles, thus restoring muscle balance, strength and flexibility.

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 is been commonly used in the field of physical therapy, orthopedics and sports medicine.

There has been only one recent study, conducted by Paoloni *et al.* [45] that investigated the effect of a combination of exercise and KT on pain and ADL in patients with CLBP. 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 [29, 30]. 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 [46].

In 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 subjects of the KT group (34.45 years) in our study, when compared to the age group of the subjects (62 years) taken by Paoloni *et al.* It is also hypothesized that the skin will be lifted due to the flexibility of the tape, creating a wider space between the skin and the muscle, leading to improvement of blood circulation and drainage of lymphatic fluids in the taped area, thereby dramatically decreasing pain, increasing ROM and improving ADL [29, 30]. An association between Proprioceptive deficits and LBP has been reported [47- 50]. Previous studies have suggested that KT may enhance Proprioceptive afferent feedback [29, 30, 51 and 52]. The 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 an increased Proprioceptive stimulus. Proprioception could be enhanced through increased cutaneous feedback supplied by KT. Applying pressure and stretching the skin at extremes of motion, similar to joint mechanoreceptors, can stimulate cutaneous mechanoreceptors and signal information of joint movement or joint position [53, 54]. When applied to CLBP patients, KT leads to pain relief and lumbar muscle function normalization after its application while, these effects persisted over a short period.

A physical therapy exercise program that involves stretching of the back, hamstring and iliopsoas muscles and strengthening of abdominal muscles using KT together may be effective in the treatment of NSCLBP in terms of relieving LBP, increasing the range of pain-free active trunk flexion and extension and improving ADL.

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