

Effects of Kinesio-Taping on Pain, Range of Motion and Isokinetic Strength of Back Extensors in Chronic Non-specific Low Back Pain Patients

Shahesta A. Osama Ghally¹, Hesham A. Ali², Mohamed Y. Abdelhamid Abdelsamee^{3,*}

¹Department of Musculoskeletal Disorders and Its Surgery, Faculty of Physical Therapy, October 6 University, Egypt

²Department of Orthopedic, Cairo University Hospitals, Cairo University, Egypt

³Department of Basic Science, Faculty of Physical Therapy, Delta University for Science and Technology, Egypt

*Corresponding author: morsyabedalfatah@hotmail.com

Abstract BACKGROUND: low back pain is a common problems that encountered in physical therapy clinic. Many treatment regime are present. Kinesio-taping is a newly treatment introduced for patients with low back pain. **OBJECTIVES:** To investigate the effect of kinesio-taping on pain, range of motion, and back muscle strength in non-specific low back pain patients. **METHODS AND MEASURES:** Twenty four patients were involved in this study. Informed consent were signed by the patients and patients were divided into two groups by randomization ,thirteen in Group A and eleven in Group B. Pain, range of motion, and back muscle strength were assessed on day one and six by VAS scale, modified-modified schober test (MMST), isokinetic dynamometer. Kinesio-taping (KT) was applied twice per six days. Group A patients were receiving I-shape KT longitudinally .Group B patients were receiving K taping Horizontally. **RESULTS:** The results of this study showed significant improvement in pain intensity and functional disability within groups. No significant differences between both groups. **CONCLUSION:** The Kinesio-taping with conventional physiotherapy will be more beneficial than kinesio- taping alone when treating nonspecific low back pain patients.

Keywords: low back, pain, Kinesio taping, range of motion, VAS Scale

Cite This Article: Shahesta A. Osama Ghally, Hesham A. Ali, and Mohamed Y. Abdelhamid Abdelsamee, "Effects of Kinesio-Taping on Pain, Range of Motion and Isokinetic Strength of Back Extensors in Chronic Non-specific Low Back Pain Patients." *American Journal of Sports Science and Medicine*, vol. 5, no. 4 (2017): 86-90. doi: 10.12691/ajssm-5-4-5.

1. Introduction

Mechanical low back pain is the general term that refers to any type of back pain caused by strain on muscle of the vertebral column and abnormal stress. Mechanical Low back pain (LBP) has substantial work disability and elevated health care costs, Chronic low back pain produces mobility restriction, long-term disability, and quality of life impairment and is one of the main causes of work absenteeism [1].

There are many causes of low back pain. It sometimes occurs after a specific movement such as lifting or bending. Just getting older also plays a role in many back conditions. As we age, our spines age with us. Aging causes degenerative changes in the spine. These changes can start in our 30s-or every younger and can make us prone to back pain, especially if we overdo our activities. Back pain varies. It may be sharp or stabbing. It can be dull, achy, or feel like a type cramp. The treatment of low back pain depends on diagnosis. The symptoms and severity of lower back pain vary greatly [2].

There are several treatments for low back pain, such as medications (anti-inflammatory, corticosteroids, paracetamol,

dipyrone, tramadol, opioids, muscle relaxants antidepressants, and anticonvulsants), physical measures (short waves, ultrasound, transcutaneous electrical stimulation, and laser), infiltration, blockade, and acupuncture. However, the effectiveness of the therapeutic interventions is not fully proven [3].

Kinesio Taping is rehabilitative technique used to facilitate the body's natural healing process while providing support and stability to muscles and joints, without restricting their range of motion. It is used in a variety of muscle-skeletal and neuromuscular problems. It is developed by Kenzo Kase, being kinesiology with chiropractic methods, based on the use of special elastic strips which mimic the density and elasticity of human skin. The elasticity of the strips is longitudinal while the waved adhesive allows normal mechanical functioning of the skin.

Kinesio tape does not contain latex, drugs or chemical substances. It consists of 100% cotton fibers and is sensitive to temperature, water resistant also facilitates lymphatic drainage [4].

Taping techniques are designed to support lower back, improve postural alignment and reduce stress on the spine during activity. They can be used for both the treatment and prevention of lower back injuries,

particularly those associated with poor posture or caused by excessive bending forward, sitting or lifting activities.

Kinesio taping is a treatment for pain and dysfunction of musculoskeletal system, using tapes which have a similar elasticity to skin. The kinesio-tape, which is attached to the skin, is thinner and more elastic than conventional tape. It can be stretched to 120%-140% of its original length, producing a lesser mechanical restraint and less restriction of mobility than conventional tape.

Four beneficial effects have been claimed for kinesio-taping normalization of muscular function, increase in lymphatic and vascular flow, and reduction in pain [5].

So, this study was conducted to examine the effect of kinesio-taping on pain, muscle strength and functional disability on non-specific low back pain.

2. Materials and Methods

Thirteen male (fifteen in group A and B, six patients dropped out of study only 24 patient continued study) were enrolled into this comparative clinical trial. Patients in groups were diagnosed as chronic mechanical back pain with mean age 22.2, mean BMI 25.6.

Patients were included in the study if they matched with the following criteria male patients their age ranges from 20-40 years old, mechanical low back pain was the chief complain without leg pain, pain more than three months. Patients were excluded if they had any of the following conditions: tumor, infection, fractures in spine, cauda equina syndromes that need urgent surgery, and patients with previous lumbar surgery.

3. Assessment Procedures

Initially demographic data and patients' characteristics were collected. This data includes height (measured to the nearest 0.1 cm), and weight (kg) (measured to the nearest 0.1 kg using a standard weight scale).

Pain intensity was assessed by visual analogue scale (VAS). It is a valid and reliable tool for assessment of pain

intensity. The VAS consists of a 10-cm line, with the left extremity indicating "no pain" and the right extremity indicating "severe pain". Participants were asked to indicate their current level of pain on this scale during activities that elicit pain (Figure 1) [6,7].

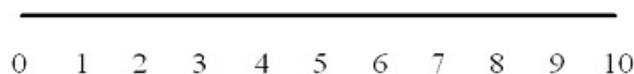


Figure 1. Visual Analogue Scale (VAS).

Range of motion assessment was done by modified-modified schober test (MMST). It is a valid and reliable test used for assessing lumbar flexion, extension movements [8].

Lumbar flexion was assessed as follow: The examiner knelt behind the standing subject and identified the posterior superior iliac spine by marking the inferior margins of the subject's posterior superior iliac spine with his or her thumbs and form a horizontal line. Another ink mark was made fifteen cm above the original mark. The tape measure was then lined up between the skin markings. With the tape measure pressed firmly against the subject's skin and while holding the tape measure with his or her fingertips, the therapist instructed the subject to bend forward. When the subject bent forward into full lumbar flexion, the new distance between the superior and inferior skin markings was measured (Figure 2).

The change in the difference between the measurement marks in standing and in flexion was used to indicate the amount of lumbar flexion [8].

Lumbar Extension was assessed as follow: The same landmarks and procedures described for the modified -modified schober flexion technique was used for measuring lumbar extension. With the subject in the erect standing position, the therapist lined up the tape measure between the markings. While holding the tape measure placed firmly against the subject's skin, the therapist instructed the subject to bend backward. Then the new distance between the superior and inferior skin markings was measured and the change in the difference between the measurement marks in standing and in extension was used to indicate the amount of lumbar extension (Figure 3) [8].



Figure 2. Lumbar Flexion Assessment



Figure 3. Lumbar Extension Assessment

The torque and power of the trunk extensors were measured by isokinetic dynamometer (Biodex Corporation, New York, USA). The isokinetic strength test is used widely to quantitatively assess muscle strength through measurement of the torque of the muscle during movement of a joint at a constant angular velocity [9,10].

The Biodex System 4 (Biodex Medical Systems, New York, NY, USA) was used to measure the torque of the trunk extensors (Figure 4). Subjects were advised to wear comfortable, loose-fitting clothing on the day of testing.

Both thighs and the back of subjects were fixed to the testing chair using straps. The axis of the dynamometer was located on the anterior superior iliac spine of the pelvis of the patient. Maximal isometric strength was measured of trunk extensors. The peak torque of force measurement was recorded. For the isokinetic strength test patients were instructed to perform flexion and extension of the back with maximum effort three times at an angular velocity of $60^\circ / s$ (Figure 4). The peak torque was expressed in Newton meter ($N \cdot m$).

4. Treatment Procedures

Kinesio-taping: Initially there are several stages to apply kinesio-taping (KT).

First, start by selecting Posterior superior iliac spine and place a point on it.

Second, we define T12 by placing the hand on the iliac crest and where the two thumbs meet between L4-L5 and then continue until we reach T12 and set another point.

After determining the points for the KT mode we will cutting the edge of the KT to prevent his fall and apply it depend on the group of patients A or B.

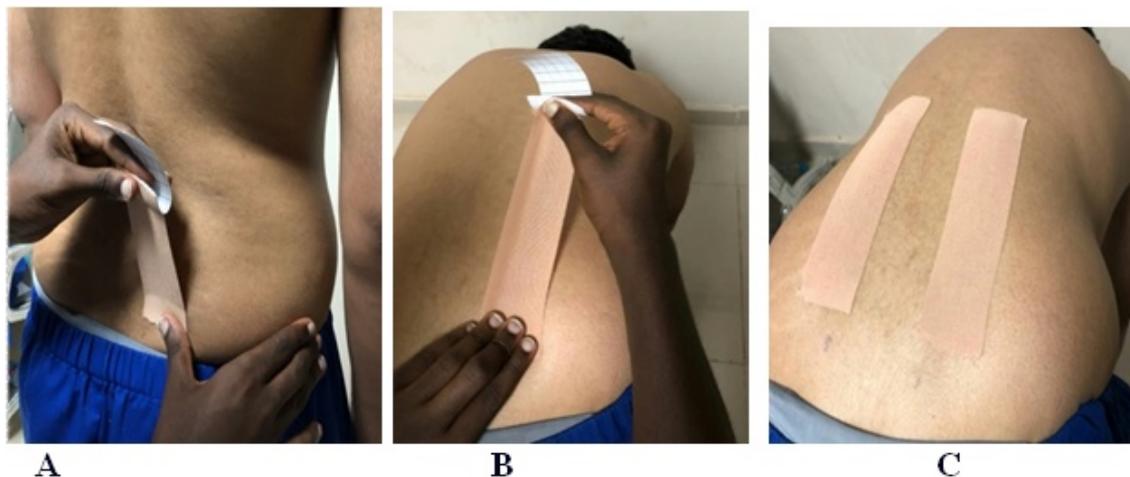
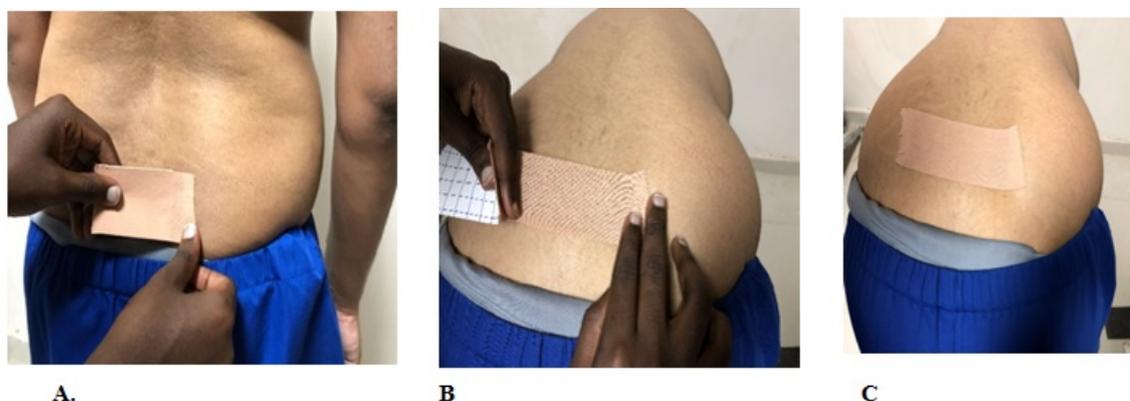
Group A: KT is placed in the form I shape and from posterior superior iliac spine to T12.

We putting the part of KT on the Posterior superior iliac spine and make the patient doing trunk flexion and we will stretching the KT 10% to 15% and putting the last part of KT on the T12 (Figure 5,a,b,c).

Group B (placebo): KT is placed horizontally and putting it on the posterior superior iliac spine.



Figure 4. The Biodex System 4

GROUP (A)**Figure 5.** Kinesio-Taping. (I Shape)**GROUP (B)****Figure 6.** Kinesio-Taping (Horizontal Shape)

We putting the part of KT on the right Posterior superior iliac spine and doing 10% to 15% stretch until we reach to the left Posterior superior iliac spine (Figure 6,a,b,c), [11].

5. Data Analysis & Results

5.1. Results

Patient demographic are present in (Table 1)

Table 1. Demographic data of the Patients

	N	Minimum	Maximum	Mean	Std. Deviation
Age	24	20	35	22.2	3.1
Weight	24	47	138	76.0	20.1
Height	24	1.6	1.9	1.7	0.1
BMI	24	17.9	37.8	25.6	5.8

Regarding pain intensity as measured by visual analogue scale, a 2 X 2 mixed- design ANOVA was calculated to examine the effects of the group (Intervention and control) and pain as measured by visual analogue scale (Pre-test and post-test) on scores.

A significant main effect for pain was found (Table 2) [$F(1,22) = 20.9, P < 0.001$]. No significant group x pain interaction was present (Table 2) [$F(1,22) = 4.19, P > 0.05$]. The main effect for group was not significant (Table 2) [$F(1,22) = 0.89, P > 0.05$].

In reference to Oswestry disability index (ODI), a 2 x 2 mixed-design ANOVA was calculated to examine the effect of the group (Intervention and control) and functional disability as measured by ODI (Pre-test and post-test) on scores. A significant main effect for disability was found (Table 2) [$F(1,22) = 28.5, P < 0.001$]. No significant group x disability interaction was present (Table 2) [$F(1,22) = 2.17, P > 0.05$]. The main effect for group was not significant (Table 2) [$F(1,22) = 1.67, P > 0.05$].

Regarding peak torque of lumbar extensors, a 2 x 2 mixed-design ANOVA was run to examine the effect of the group (Intervention and control) and the torque generated by trunk extensors as measured by isokinetic dynamometer (Pre-test and post-test) on scores. No significant main effects or interactions were found.

The group x peak torque interaction (Table 2) [$F(1,22) = 1.3, P > 0.05$], the main effect of torque (Table 2) [$F(1,22) = 1.78, P > 0.05$], and the main effect for group (Table 2) [$F(1,22) = 0.21, P > 0.05$] were not significant. The peak torque of lumbar extensors was not

influenced by either time of measurements or the group being measured.

Table 2. Comparison between Groups Regarding Pain, Functional Disability

	N	Minimum	Maximum	Mean	Std. Deviation
VAS_Pre_I	13	1.00	6.00	3.5000	1.32288
VAS_Post_I	13	.00	5.00	2.3077	1.29965
VAS_Pre_C	11	2.00	6.00	3.6364	1.36182
VAS_Post_C	11	1.00	6.00	3.1818	1.53741
ODI_Pre_I	13	2.00	14.00	6.3077	3.19856
ODI_Post_I	13	1.00	12.00	4.3846	2.87340
ODI_Pre_C	11	3.00	11.00	7.2727	2.37027
ODI_Post_C	11	3.00	9.00	6.1818	2.04050
Valid N (listwise)	11				

6. Discussion

The purpose of this study was to investigate the effect of kinesio- taping on pain, muscle strength and functional disability on non-specific low back pain.

The results of this study showed that was significant improvement in pain and functional disability within. While there was no significant improvement between groups, and interaction.

Also the result showed that was no significant improvement in muscle strength within, between groups and interaction.

Regarding to pain intensity, and functional disability, our results were in line with Parreira Pdo et al., 2014 [12] who found that outcomes of pain intensity and functional disability, with no significant differences between the two treatment conditions.

Although KT is widely used in clinical practice, the current evidence does not support the use of this intervention. The conclusions from this review are based on a number of underpowered studies, therefore large and well-designed trials are greatly needed.

Our results were in contrast with Castro-Sánchez et al., 2012 Spain [5] that found the Individuals with chronic non specific low back pain experienced statistically significant improvements immediately after the application of KT in functional disability and reduce pain intensity.

The effects were generally small and only the improvements in pain were observed after 4 weeks.

Regarding trunk extensors strength, we didn't find previous studies to agree or disagree with our results.

7. Conclusion

The kinesio-taping with conventional physiotherapy is more beneficial than kinesio-taping alone when treating nonspecific low back pain patients.

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