



Faculty Of physical Therap  
Cairo University



## **Effect of H Technique versus X Technique kinesio taping on Mechanical Low Back Dysfunction**

**Ahmed M. Elshinnawy Sahar M. Hassan Emad Eldin Mohamed Abd Elatief**

### **Introduction**

Low back dysfunction refers to an alteration of spinal joint position, motion characteristics and/or related palpable paraspinal soft tissue changes with symptoms varying with physical activity. It includes any abnormality in the function of the back, describing pain from innervated structures of the back.<sup>(1)</sup> Chronic mechanical low back dysfunction (CMLBD) developed as a result of poor postural habit, spondylosis, trauma or disc derangement. The dysfunction syndrome is the condition in which adaptive shortening and resultant loss of mobility causes pain before achievement of full normal end range of movement. Essentially, the condition arises because movement is performed inadequately at a time when shortening of soft tissues is taking place.<sup>(2)</sup>

Treatment of chronic low back dysfunction aims to obtain a functional and painless low back region through pain management, and regaining lumbar range of motion (ROM). Several interventions, such as exercises (stretching, strengthening, functional and proprioceptive exercises) or electrotherapy, as well as physical methods of modifying pain as taping have been used to facilitate patient functional recovery and regain ROM<sup>(3)</sup>. The kinesio taping (KT) method is a definitive rehabilitative taping technique used to facilitate

the body's natural healing process while providing support and stability to muscles and joints without any restriction to body movement<sup>(4)</sup>.

Lymphatic liquid stream gets to be distinctly discouraged in ranges of harmed tissues. Also discourage the regular mending process consequently hindering recuperation. The tape is regularly connected unstretched. In this circumstance, the skin of the influenced territory is extended before the utilization of the kinesio tape (KT). This is finished by lengthening the muscles and joints in the influenced territory and after applying the tape. As the muscles and joints come back to their typical positions, the taped skin will start to frame convolutions (an expansive influence).<sup>(5)</sup>

Kinesio Taping helps to alleviate pain, increase blood flow and facilitates in the channeling of lymphatic fluids away from the injured area by microscopically lifting the skin. The convolutions that it creates in the skin helps increase interstitial space (space between the skin and muscles), allowing for better drainage of the swelling which results in pressure and irritation being removed from neural sensory receptors and ultimately relieving pain.<sup>(6)</sup>

If joints or ligaments are injured, it need to provide more of a supporting network. In this situation the tape should be stretched before applying it to the skin. Ligaments and joints that have become damaged typically lose their ability to stabilize and to provide proper functional control to a segment, thereby relying on stretched tape for this correction. Kinesio Taping is based on a different philosophy that aims to give free range of motion in order to allow the body's muscular system to heal itself bio-mechanically.<sup>(7)</sup>

There are several techniques of Kinesio Tape (KT) can be applied on lower back area including H technique and Cross (X) technique <sup>(8)</sup>. Previous studies had supported the efficacy of these treatment techniques for addressing inflammation, promoting a faster return to activity, enhancing proprioception training, reducing pain, enhancing neurological function post injury, and reducing muscle imbalances <sup>(11)</sup>. They may provide proper sensory feedback to patients in order to decrease fear of movement, which can improve pain and range of motion. Also these techniques are useful in increasing lower trunk ROM <sup>(5,6)</sup>.

H technique is used to relieve pain, reduce inflammation and eliminate muscle spasm, it is effective for those suffering from back pain related to inflammation, poor posture, improper movement patterns, overuse, and more. Cross (X) technique increases blood circulation in the taped area and this physiological change may affect the muscle and myofascial functions after the application of Kinesio tape <sup>(10)</sup>.

The purpose of this study was to compare the effect of two different techniques of kinesio taping on pain, functional disability, lumbar ROM in patients with chronic mechanical low back dysfunction.

## **Material and methods**

### **Procedure**

All participant in this study were assigned randomly into three groups; **Group A** received (H technique of Kinesio tape), **Group B** received (Cross (X) technique of Kinesio tape) and **group C (control group)** received traditional program (infrared and ultrasonic). All groups received stretching exercises for hamstring, calf and back muscles and strengthening exercises for back and abdominal muscle).

### **Subject's Selection:**

Forty-five patients (29 males and 16 females) with chronic mechanical low back dysfunction (CMLBD) participated in this study (from February 2016 to October 2016) with their ages ranged from 40-50 years old participated in this study, the study has been conducted in the Outclinic, Cairo university hospitals. All patients were referred by an Neurologist. These patients were randomly divided into three equal groups with fifteen patients in each one.

### **Inclusion criteria:**

Patients with mechanical low back dysfunction for at least 3 months ago, able to perform (ROM) test of Lumbar Spine (flexion, extension and side binding) and had good self –reported general health.

### **Exclusion criteria:**

Post laminectomy syndrome, hypersensitivity to the tape, neurologic deficit, symptoms of vertigo or dizziness.

### **Intervention**

The tape used in the study was waterproof, porous and adhesive with a width of 5 cm and thickness of 0.5 mm.

### **Taping Procedures:**

#### **H technique application**

- Bilateral kinesio I strip were used for bilateral erector spinea muscle, The patient moves into mild flexion with the application of two I strip vertically on both sides of the back from mid thoracic area to end of lumbar region, The third strip is a space correction technique. Measure a kinesio I

strip long enough to extend approximately two inches on both sides of the previously applied kinesio strips, applied horizontally over the region of the greatest pain or spasm, and the tension was approximately 15 to 25% on the vertical tape. The direction of application was from insertion to origin to inhibit overused or stretched muscles <sup>(11)</sup>.

### **Cross (X) technique application**

- Bilateral Kinesio I strips was used, Have the patient move into mild flexion, apply the first I strip started from the inferior posterior angle of the thoracic ribs with no tension, moving across the lumbar region (the area of pain) with moderate tension "25% available", ending at the level of the sacrum with no tension, and the second I strip on the opposite side <sup>(12)</sup>.

### **Exercise procedure**

- Stretching exercises for hamstring, calf muscles, and back muscles for 30 seconds three times with 30 seconds relaxation inbetween.

- Strengthening exercises for back muscles (bridging and active back extension) and abdominal muscles (sit up exercise, and posterior pelvic tilt). All patients in the three groups are applied the program three times a week (with the frequency of three repetitions at session with hold for 30 seconds).

### **Outcome Measures**

#### **Pain Intensity:**

Visual analogue scale (VAS) was used to measure the pain intensity which uses a 10 cm line with 0 (no pain) and 10 (worst pain) on the other end,

Patients were asked to place a mark along the line to denote their level of pain<sup>(13)</sup>.

### **Lumbar range of motion**

Spinal ROM was assessed by bubble inclinometer, it has a circular tube partially filled with a colored fluid that moves with motion, it has movable circular dial with degree markings<sup>(14)</sup>.

#### Technique of application:

#### **Assessment of lumbar flexion:**

The starting position as the patient was instructed to stand erect with feet contact to each other. One inclinometer was placed on T12 and the other one on S1 and both were calibrated to zero. The patient was instructed to slowly bend forward to end of range within limit of pain. The reading on each inclinometer was recorded. Subtracting the bottom reading from the above reading gave an accurate reading of degrees of flexion in the lumbar spine<sup>(14)</sup>.

#### **Assessment of lumbar extension:**

From the standing position whereas one inclinometer above the T12 vertebrae and the other inclinometer was placed at the S1, and then asked the patient from the neutral position to lean backward till the limit of pain

#### **Assessment of side bending:**

From standing position the inclinometer was placed on the sacrum and the patient was asked to lean to the left and right sides till limit of pain<sup>(15)</sup>. All outcome measurements were measured pretreatment program and after four weeks of the program.

## Statistical Analysis

After data collection, statistical analysis was done using SPSS (Version 18). The mean and standard deviation were presented as descriptive statistics. ANOVA F-Test was used to compare between the results of the three groups as an inferential statistic. 0.05 was considered as a significant level.

## Results

The subjects in the three groups were comparable as regards their demographic parameters, as shown in table (1), there was no significant difference between the three groups.

Table (1): Demographic data of the three groups (mean  $\pm$  S.D.).

	Group A (n=15)	Group B (n=15)	Group C (n=15)	Significance P-value	
Age (years)	44.4 $\pm$ 2.943	44.5 $\pm$ 3.3	44.6 $\pm$ 3.2	0.259	NS
Height (cm)	171.56 $\pm$ 6.72	172.37 $\pm$ 8.17	170.03 $\pm$ 8.55	0.267	NS
Weight (kg)	85.53 $\pm$ 10.01	85.9 $\pm$ 9.66	87.7 $\pm$ 11.22	0.655	NS

Pre-treatment there were no significant differences between the means of the three groups regarding Pain and ROM. The F-test and the p-values for pain, range of motion flexion, extension, right side bending, and left side bending were 1.345 (0.268), 0.312 (0.733), 0.292 (0.75), 1.662 (0.196) and 2.578 (0.082) respectively. Results showed that there were statistical significant differences between the pre-treatment and the post treatment measurements of each group (Table 2).

Table (2): Comparison between pre and post treatment values of the three groups for pain intensity:

	Group A		Group B		Group C	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Pain	8.1 ± 0.844	2.1 ± 1.16	7.8 ± 0.87	1.9 ± 1.16	8.1 ± 0.711	2.2 ± 1.09

\*P-value ≤ 0.05

Table (3): Comparison between pre and post treatment values of the three groups for lumbar ROM:

	Group A		Group B		Group C	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Flexion	27.4 ± 1.46	47.6 ± 1.22	27.7 ± 1.51	47.8 ± 1.09	27.5 ± 1.51	47.4 ± 1.3
Extension	8.1 ± 0.96	16.3 ± 1.29	8 ± 1.02	16.4 ± 1.38	7.9 ± 1.06	16.2 ± 1.19
Right side bending	9.6 ± 0.67	16.2 ± 1.19	9.9 ± 0.71	16.6 ± 1.45	9.6 ± 0.813	16 ± 1.11
Left side bending	9.9 ± 0.71	15.9 ± 1.16	9.7 ± 0.65	16.6 ± 1.45	9.7 ± 0.69	16.13 ± 1.29

Within groups, the t-test for the difference between pre and post treatment showed a significant difference in the levels of pain intensity (fig. 1) and lumbar range of motion (fig.2, 3).



In addition, there were no significant differences between the means of the three groups regarding Pain and Range of motion. The F-test and the p-values for pain, range of motion flexion, extension, right side bending, and left side bending were 0.543 (0.582), 0.821 (0.443), 0.181 (0.835), 1.765 (0.177) and 3.076 (0.053) respectively. Results showed that there were no statistical significant difference between the post treatment measurements of the three groups. (fig 1 and 2)

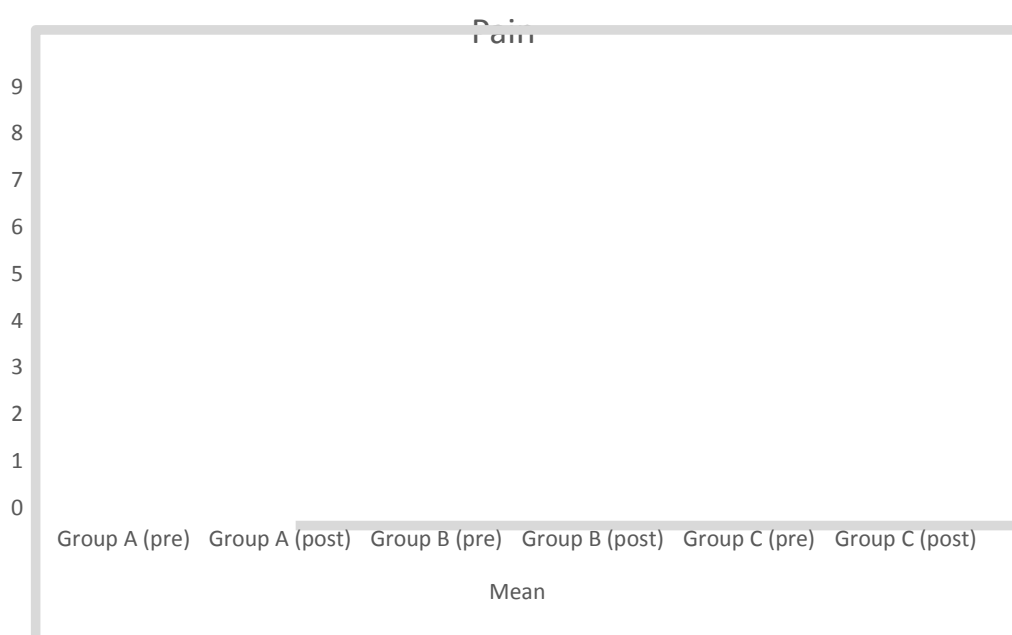


Figure (1): Mean values of pre and post-treatment of pain intensity among the three groups.

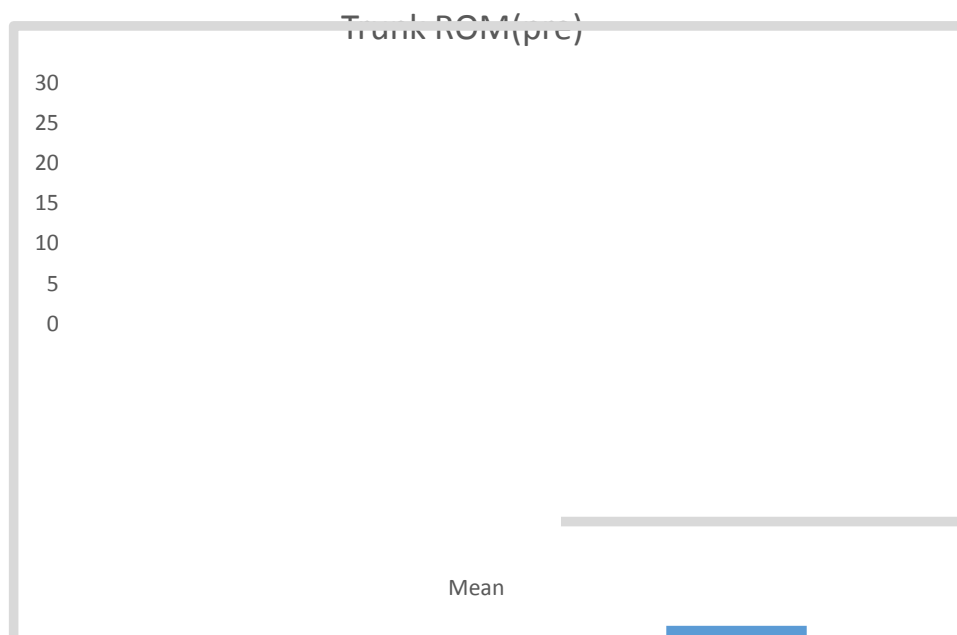


Figure (2): Mean values of pre-treatment of ROM among the three groups.

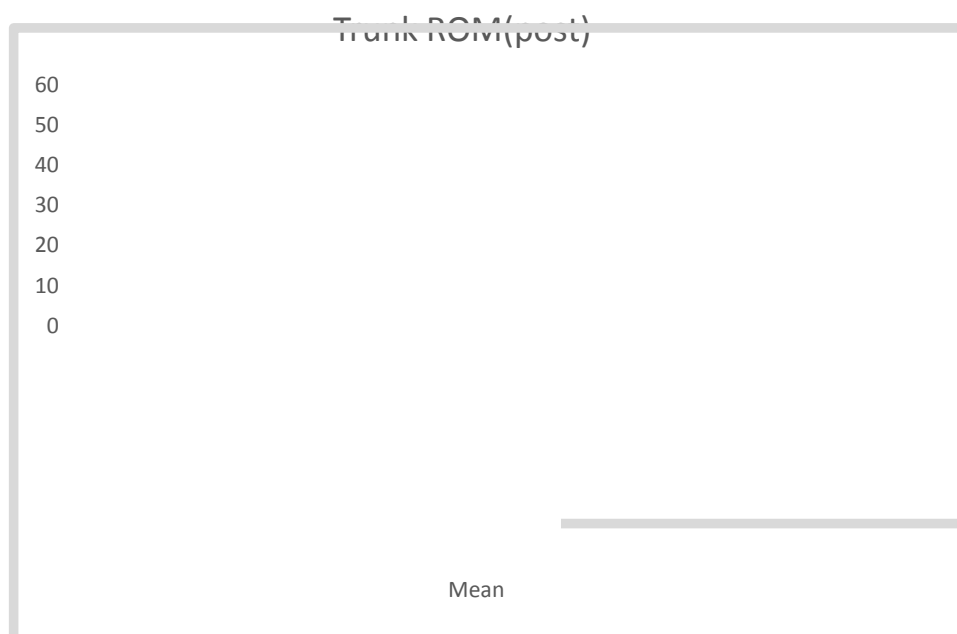


Figure (3): Mean values of post-treatment of ROM for the three groups.

## Discussion

Previous studies investigated the effect of KT on pain, disability and range of motion <sup>(11, 12, 14 and 15)</sup>. This study compared between the effect of two different kinesio taping techniques. The purpose of this study was to compare between H and X techniques on pain, functional disability and lumbar ROM in patients with chronic mechanical low back dysfunction patients.

The statistical results revealed that there were a statistical significant improvement within each group with no statistical significant difference between two groups (pain and lumbar ROM) post treatment.

The findings regarding of this study is in consistent with the study of Paoloni et al. (2014) which investigated the effect of a combination of exercise and KT on pain in patients with CLBP. The rseachers found that a highly significant decrease in pain intensity using VAS in kinesio taping group than exercise only after four weeks, this decrease in pain may attributed to stretch of the skin and applying an external load that may stimulate cutaneous mechanoreceptors (large myelinated fibers) and inhibit pain transmission according to the pain gate control theory <sup>(17, 18)</sup>.

This study agreed with Fahad et al (2013), they found a highly significant reduction in disability in the KT group by using the Roland Morris Disability Questionnaire (RMDQ) as well as improvement in lumbar ROM. The researcher stated that these changes may be attributed to the subjects of the KT group <sup>(19)</sup>.

The result of this study goes with Yoshida and Kahanov (2015), they investigated the effect of KT on lumbar range of motion in thirty healthy

subjects with no history of lower trunk or back disorders issues. The subjects performed two experimental measurements of range of motion (with or without the application of KT) in trunk flexion, extension and right lateral flexion, through evaluation of the sum of all scores, KT group show a significant improvement in ROM compared with non KT group. 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 that enhanced through increased cutaneous feedback supplied by KT <sup>(20)</sup>.

### **Conclusion**

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

### **References**

- 1)Campell C and Muncer S:** The causes at low back pain: A network analysis. *Social science and medicine*, 2012; 60 (2): 409-410
- 2)David G, Sam W and Scott D:** Low back and neck pain *Comprehensive diagnosis and management; Anatomy and Biomechanics of the Cervical and lumbar spine*". Philadelphia: Saunders, 2014; 1: 30-31
- 3)Kaya E, Zinnuroglu M and Tugcu I:** Kinesio taping compared to physical therapy modalities for the treatment of shoulder impingement syndrome. *ClinRheumatol* 2015; 30(2):201–207.
- 4)Kase K and Wallis J:** The latest kinesio tapping method. *Ski-Journal (Tokyo)*, 2014:35.

- 5) **Kase K, Wallis J and Kase T:** Clinical Therapeutic Application of the Kinesio Taping Method. Tokyo, Japan: Ken' i-kai Information, 2012; P. 83-122.
- 6) **Kase K, Wallis J.:** The latest kinesio taping method. Tokyo: Ski-Journal 2012
- 7) **Pijnappel H.:** Handbook of Medical taping concept. 1. Madrid: Aneid Press., 2011
- 8) **Gonzalez-Iglesias J, Fernandez-de-Las-Peñas C, Cleland J, Huijbregts P and Del Rosario Gutierrez-Vega M:** Short-term effects of cervical kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: a randomized clinical trial. The Journal of orthopaedic And Sports Physical Therapy.2011; 39 (7):515-521.
- 9) **Yoshida A and Kahanov L:** The effect of kinesio taping on lower trunk range of motions. Res Sports Med. Apr-Jun 2013; 15(2):103-112.
- 10) **Kim C, Kim A, Kim M, Kim S, Yoo H and Lee S:** The efficacy of Kinesio taping in patients with a low back pain. J Korean AcadFam Med. 2016; 23:197-204.
- 11) **Basset KT, Lingman SA, Ellis RF.** The use and treatment efficacy kinaesthetic taping for musculoskeletal conditions: a systematic review. New Zealand Journal of Physiotherapy 2010;38(2):56-62.
- 12) **Marc A:** Pain measurement, in P. Prithvi Ray: pain medicine a comprehensive review, mobsy, Los Angeles, California, USA, 2014; 36-37.
- 13) **Resnik L and Dobrykowski E:** Outcome measurements for patients with Low Back Pain. Orthopedic Nursing.2015; 24 (1): 14-24.
- 14) **Norkin C and White D:** Measurement of Joint motion. A guide to Goniometry. 3rd edition. Philadelphia. F.A. Davis Company, 2014; 45.
- 15) **Georgy, E.E.** Lumbar Repositioning Accuracy as a Measure of Proprioception in Patients with Back Dysfunction and Healthy Controls. Asian Spine J., 2012, 5: 201-7.

- 16) Murray, H. and L. Husk,. Effect of Kinesio taping on proprioception in the ankle [Abstract]. J Orthop Sports Phys. Ther., 2012, 31: A37.
- 17) Paoloni, M., A Bernetti, G Fratocchi, M. Mangone, L.Parrilleno, M. Del Pilar, L. Cooper, Sesto, L. Di Sante and V. Santilli. Kinesio taping applied to lumbar muscles influences clinical and electromyographic characteristics in chronic low back pain patients. Eur. J. Phys, Rehabil. Med, 2014. 47: 1-2.
- 18) Kase, K., J. Wallis and T. Kase,. Clinical Diagnosis and Therapy. Waikanae: New Zealand Therapeutic Applications of the Kinesio Taping Spinal Publications, xvii-xix. Method. 2 ed. Tokyo, Japan: Ken Ikai Co Ltd., 44, 2013.
- 19) Fahad AlBahel, Ashraf Ramadan Hafez, Abdul Rahim Zakaria and Abdulaziz Al-Ahaideb. Kinesio Taping for the Treatment of Mechanical Low Back Pain, 2013.
- 20) Yoshida A and Kahanov L: The effect of kinesio taping on lower trunk range of motions. Res Sports Med. Apr-Jun 2015; 15(2):103-112.

### تأثير تقنية H مقابل تقنية X لشريط كينزيو الاصق الطبي على ضعف الظهر الحركى المزمن

#### المخلص العربى

ضعف الظهر يعتبر مشكلة شائعة تصيب العديد فى المجتمع، ويمكن أن تؤدي إلى إعاقة وظيفية. شارك فى الدراسة خمسة وأربعون مريضا (من كلا الجنسين) مع ضعف مزمن حركى للظهر (CMLBD). تراوحت أعمار المشاركين فى الدراسة 40 حتي 50 عاما. تم تقسيم جميع المشاركين عشوائيا إلى ثلاث مجموعات. المجموعة (أ) تلقت تقنية H لشريط كينزيو الاصق الطبي والمجموعة (ب) X لشريط كينزيو الاصق الطبي بالإضافة إلى تمارين اطالة لوتار الركبة، الساق وعضلات الظهر وتمارين التقوية للظهر وعضلات البطن بالاضافه الى مجموعة (C) التى تلقت برنامج التمارين التقليدي السابق. الجلسات طبقت ثلاث مرات فى الأسبوع لمدة أربعة أسابيع. مقياس النتائج: مقياس لشدة الألم و قياس مدار الحركة للجذع. النتائج: كانت هناك فروق ذات دلالة إحصائية فى قياس شدة الألم، و مدار حركة الجذع فى قيمة  $0.001 \geq$ . الخلاصة: برنامج العلاج الطبيعى التى

تشمل على تمارين اطاله لاوتار الركبة، الساق وعضلات الظهر وتمارين تقوية لعضلات البطن والظهر بالاضافه الى شريط كينزيو الاصق الطبى كان مفيدا في علاج ضعف الظهر الحركى المزمن.

الكلمات الداله: ضعف الظهر الحركى المزمن ، شريط كينزيو الاصق الطبى.