



Efficacy of K-Tape in Chronic Mechanical Low Back Pain

Muteb Al Sulaimy^{*}, Nezar Al Torairi², Sharick Shamsi³, Shabana Khan⁴

^{}Physiotherapist at Prince Sultan Cardiac Center, Riyadh KSA*

²Clinical Supervisor in Ortho OPD, Prince Sultan Military Medical City, Riyadh KSA

³Senior Physiotherapist at Prince Sultan Military Medical City, Riyadh KSA.

⁴Physiotherapist in Prince Sultan Military Medical City, Riyadh KSA

ABSTRACT

Efficacy of K-Tape in Chronic Mechanical Low Back Pain. Randomized Control Trial. A total of 30 patients were included as per pre define inclusion and exclusion criteria and randomly assigned into two groups, consisting of 15 patients in each group. Group A was given K-Tape along with standardized exercise program. Group B was given standardized exercise program along with moist hot pack for 4 weeks, 3 sessions per week one session per day. The patient's outcome measures were assessed by visual analog scale, ODI and Goniometry for Lumbar Range of Motion. Measurements were recorded before and after the end of the treatment period. Results revealed that means and S.D of both group were significant ($p=0.000$) statically but clinically the Group of patients treated with K-Tape along with standardized exercise program managed pain (pre= 7.50 ± 1.21 , post= 0.71 ± 0.37), ODI (pre= 41 ± 18.16 , post= 8 ± 4.49) and range of motion (flexion pre= 31 ± 5.04 , post= 50 ± 10.12 , extension pre= 17 ± 2.13 , post= 29 ± 4.20 Rt side flexion pre= 10 ± 2.55 , post= 22 ± 4.75 and Lt. side flexion pre= 10 ± 2.35 , post= 22 ± 4.63 , Rt side rotation pre= 8 ± 1.27 , post= 19 ± 2.65) Lt. side rotation pre= 8 ± 2.15 , post= 18 ± 2.46 better than group of patients treated with standardized exercise program along with Moist hot pack in terms of pain (pre= 7.81 ± 1.16 , post= 2.35 ± 1.27), ODI (pre= 44 ± 21.32 , post= 22 ± 10.6) and range of motion (flexion pre= 25 ± 5.65 , post= 37 ± 10.16 , extension pre= 15 ± 2.55 , post= 21 ± 5.32 , Rt side flexion pre= 10 ± 2.35 post= 15 ± 2.28 , Lt Side flexion pre= 11 ± 2.35 , post= 19 ± 2.36 , Rt side rotation pre= 9 ± 1.90 post= 16 ± 2.71 , Lt Side rotation pre= 8 ± 1.63 , post= 15 ± 3.15). The result of study suggests that both K-Tape and exercises improves the symptoms of chronic low back pain. Better improvement was shown by K-Tape group when compared with exercise group. Based on these results K-Tape and Exercise should be the treatment of choice for chronic mechanical low back pain rather than Exercise with HP.

Keywords: K-Tape, Chronic Low Back Pain, Moist hot Pack, Exercise.

*Corresponding Author Email sharickshamsi@gmail.com

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INTRODUCTION

Low back pain is an extremely common health problem and most of the subjects experience it at some point of their life¹. The yearly prevalence of low back pain ranges from 5% to as high as 65%. Lifetime prevalence can range up to 84% and the monthly prevalence has been placed between 35% and 37%^{2,3}. Nachem son in 1976 defined low back pain as an acute, sub-acute or chronic episode, which is characterized either by a slowly or a suddenly occurring rather sharp pain with or without radiation over the buttocks or slightly down the leg, with concomitant restriction of motion, when subsiding to the chronic type, the pain will be a little less severe and continue for more than two months. 80-90% of low back pain is of mechanical origin and the source of the pain is the spine or its supporting structures⁴. 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%⁵. Another study found the prevalence of back pain among Saudi school workers in the city of Jeddah, Saudi Arabia was 26.2%⁶. The prevalence of LBP is highest among women and individuals aged 40–80 years⁷. LBP is traditionally defined accordingly to the duration of symptoms, where symptoms lasting less than 12 weeks are defined as acute or sub acute LBP, and symptoms lasting more than 12 weeks as chronic LBP^{8,9}. There are various therapeutic interventions used in the management of low back pain. Each one has its own effectiveness. One interesting and relatively new method for treating musculoskeletal conditions is the application of Kinesio Taping (KT), an elastic tape that can be stretched to 140% of its original length, thereby exerting constant shear force on the skin. KT was conceived to be therapeutic and, according to its creators, yields the following results: 1) it corrects muscle function by strengthening weak muscles; 2) it improves blood and lymph circulation by eliminating tissue fluid or bleeding beneath the skin through muscle movement; 3) it reduces pain through neurological suppression; 4) it corrects misaligned joints by retrieving muscle spasm^{10,11}. When applied to the patient's trunk, KT increases active lumbar flexion¹². The recommended physiotherapy management for LBP comprises a wide range of treatment strategies, including electrotherapy, manual therapy, cognitive behavioral therapy, and exercise¹³. Exercise has also been widely applied by physiotherapists in clinical settings to treat LBP^{13,14}. Exercise therapy focuses on the prescription of muscular contraction and body movement to improve overall health¹⁵. One of exercises programs for low back pain can be McKenzie approach that consists of six specific exercises, in certain positions (laying in prone position, standing, laying in supine position and sitting), which

gradually increasing pressure on vertebra. During this exercise program postural correction is needed as well as observation of all changing in pain intensity and location. McKenzie exercise program can start in acute pain and performed in all pain stages. It is not allowed to feel any leg pain during exercising, and if that happened, patients have to do the previous exercise. These exercises can be called self-manipulation exercises and it has to be done in small session but frequently, during the day. Number of sessions and daily frequency depends on the stage of disease and pain intensity¹⁶⁻¹⁸. Therefore, this study aimed to investigate the additional efficacy of K Tape along with standardized exercise program on pain, range of motion and functional disability in subjects with chronic mechanical low back pain.

MATERIALS AND METHOD

The study was designed as Randomized Control Trial and has two groups, Group A was given K-Tape along with standardized exercise program while Group B was given standardized exercise along with Moist Hot Pack (MHP). It was conducted at Physical Therapy Department of Prince Sultan Military Medical City- Riyadh Saudi Arabia.

Inclusion criteria¹⁹

- Not involved in regular exercise over the previous 6 months.
- Able to exercise within a limited range of joint motion.
- Duration of pain in low back more than three months.
- Aged between 20 to 45 years.

Exclusion criteria^{20,21}

- Traumatic injury to spine.
- Any neurological involvement like radiculopathy.
- Infective conditions of spine.
- Autoimmune disorders/ malignancy.
- Any history of spinal surgery.
- Loss of lumbar lordosis &/or listing suggestive of inter-vertebral disc prolapse, spinal deformity, osteoporosis
- Cardiopulmonary disease with decreased activity tolerance.
- A total of 30 patients were included as per inclusion criteria. Patients were randomly assignment into two groups A and B with 15 patients in each group. Baseline assessment using Visual analog Scale (VAS), Oswes try Disability Index (ODI) and Goniometry was done respectively for Pain, Function and Lumbar range of motion for

both groups. 12 sessions were given for 4 weeks, 3 sessions per week one session per day to both groups. Home plan consisted of exercise therapy i.e. knee to chest, bridging, back extension exercises for both groups for once a day with 10 repetitions of each exercise every day²².

K-Taping Technique:

Two I shaped K-Tapes (fig.1) were applied from erector spine muscle from its origin to insertion in lumbar region. Treatment area was properly cleaned, hair free and measurement of K-tape was done with lumbar spine into full flexion. First four cm to five cm of K-tape was twisted and removed from its paper. The patient was asked to perform maximum flexion of spine (fig.2), except for the final four cm to five cm and K-tape was also used on one aspect paraverteb rally within bone direction with mild traction. The ultimate four cm to five cm of K-tape was applied without traction. Same method was used on opposite side .Firm pressure was applied on K-tape by hand using repeated back and forth motion to warm the adhesive for proper adhesion The tape was applied three times per week for four consecutive weeks (12 sessions)^{22,23}.

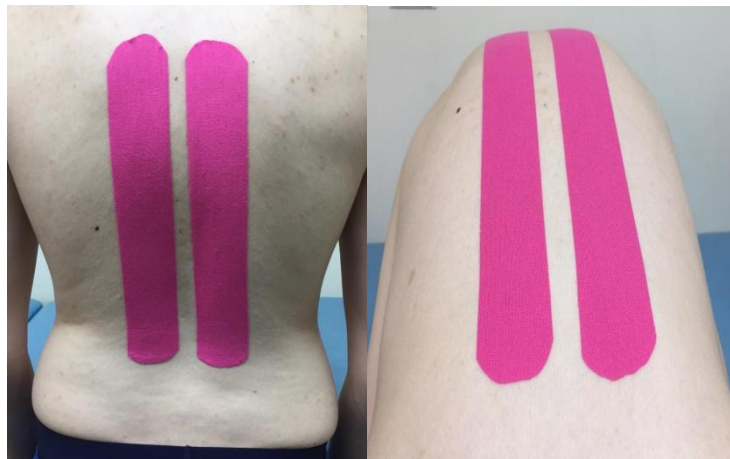


Fig.1- I shape K-Taping Fig. 2- flexion of spine

Exercise Program:

All Subjects in both the groups had received standardized exercises program under the physical therapist supervision which included core stabilization exercise and stretching exercises for back muscles, hamstring and iliopsoas muscles using standard methods. These exercises were performed 10 repetitions 3 sets with 30 sec hold & 30 sec rest between each repetition. Further rest of 30 sec were given between the sets and it was performed 3 sessions per week for 4 weeks. At the same time all subjects in both the groups were explained about postural and back care advice. (Abdominal Hollowing Exercise), abdominal “tuck in” in high sitting position, Bird dog exercise in quadruped position, bridging on the floor without leg extension²².

Moist Hot Pack Technique:

MHP was applied for 20 min²⁴ which was preheated for at least 24 hours in a hydro collator at 85° to 90° C. The participants were informed that the heat of MHP should be to comfortably warm only. Physiotherapist placed the MHP while patient in prone position (fig. 3), covered with a cover and 2 or 3 layers of toweling, on every patient's back. If the level of perceived heating exceeded comfortable warmth, more toweling was added immediately to ensure the heating remained to comfortably warm only²⁵.



Figure 3: Moist Hot Pack

Data Analysis:

Data was analyzed with SPSS 20. Outcome measures were calculated as mean and standard deviation and compared by using paired and independent sample t-test. P-value of less than 0.05 was taken as significant. The study was approved by Physical Therapy Department of PSMCC. Informed consent was taken from all patients before enrollment in the study to assure willingness, confidentiality of information and to aware the patients about all procedure and interventions.

RESULT AND DISCUSSION

In this study 30 patients participated with a mean age of 41.28±15.31 in group A and 41.55±16.30 in Group B ranging from 20 to 45 years. (Table 1)

Table1: Mean and SD of age between group A and B

	Group A (N=30)	Group B (N=30)
	Mean±SD	Mean±SD
Age (yrs)	41.28±15.31	41.55±16.30

Mean reduction in VAS

Both groups had clinical significant difference in pre R_x to Post R_x values as t and p values for group A and B were t=12.25, p=0.003 and t=16.75, p=0.010 respectively. (Table 2)

Mean reduction in VAS

Table 2: Mean reduction in VAS values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with t and p values.

Groups	Pre Rx	Post Rx	Pre Rx to Post Rx		
			Mean±SD	Paired T value	p value
Group A (N=15) Mean±SD	7.50±1.21	0.71±0.37	2.32±0.34	12.25	0.003
Group B (N=15) Mean±SD	7.81±1.16	2.35±1.27	5.21±1.11	16.46	0.010

Mean reduction in ODI

Both groups had significant difference in pre Rx to Post Rx p=0.000 respectively (Table 3)

Mean reduction in ODI

Table 3: Mean reduction in ODI values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with p values.

Groups	Pre Rx	Post Rx	P Value
Group A (N=15) Mean±SD	41±18.16	8±4.49	0.000
Group B (N=15) Mean±SD	44±21.32	22±10.6	0.000

Mean reduction in ROM

Both groups had significant difference in pre Rx to Post Rx p=0.000 respectively (Table 4)

Mean reduction in ROM

Table 4: Mean reduction in ROM values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with p values

ROM	Group A (N=15) (Mean±S.D)		Group B (N=15) (Mean±S.D)		p-value (<0.05)
	Pre Rx	Post Rx	Pre Rx	Post Rx	
Flexion	31±5.04	50±10.12	25±5.65	37±10.16	.001
Extension	17±2.13	29±4.20	15±2.55	21±5.32	.000
Rt. Side flexion	10±2.55	22±4.75	10±2.35	15±2.28	.001
Lt. Side flexion	10±2.35	22±4.63	11±2.35	19±2.36	.000
Rt. Rotation	8±1.27	19±2.65	9±1.90	16±2.71	.005
Lt. Rotation	8±2.15	18±2.46	8±1.63	15±3.15	.000

This study was done to investigate effects of K-Tape consisted of standardized exercise program in patients of chronic mechanical low back pain. 30 subjects with chronic mechanical low back (CMLBP) were recruited. Pain, function and lumbar range of motion for both groups were assessed. Results of this study concluded that there are greater effects of K-Tape on lumbar ROM, pain relief and improvement of function, consisted of standardized exercise program when given to patients of CMLBP.

Kenzo Kase (2003) suggested that application of KT alleviates pain, facilitates lymphatic drainage by microscopically lifting the skin. KT creates a convolution in the skin that increases interstitial space. The results are that pressure and irritation are gradually taken off the neural and sensory receptors that help to alleviate pain. Pressure on the lymphatic system is also taken off so it allows draining more freely^{22,26}.

Another possible mechanism suggested by Kase et al (2003) that KT induce these changes which may be due to neural feedback received by the subjects, which may improve their ability to reduce the mechanical irritation of soft tissues when moving the lumbar spine²⁷.

Application of KT for 4 weeks in situ gave the subjects a greater awareness of the low back while moving, thus preventing movements that were detrimental to the healing of the affected lumbar tissues, it also enhance a greater confidence in the subjects to remain active despite their pain²⁸.

The application of KT may apply pressure to the skin or stretch the skin and this external load may stimulate cutaneous mechanoreceptors causing physiological changes in the taped area. So it can be concluded from previous literature that KT might have worked in the same way to reduce pain²².

Law ford et al. 2016 study was designed to reduce lower back pain with two different exercise types²⁹.

Kumar T et. al 2014 efficacy of muscle strengthening exercises among patients with chronic low back pain. The results revealed that after the muscle strengthening exercises the level of pain as measured by the numeric rating scale was reduced after the intervention, and there was no significant improvement in the level of pain in the control group³⁰.

According to Rainville et al. 1997, Strengthening was the predominant exercise in 12 out of 16 trials, two-thirds of which were of 'high' exercise quality. The lumbar spine or lumbar spine and lower limbs were the most commonly targeted body sites. This is in keeping with the conclusions of the study³¹.

One study evaluating hot and cold applications, it was shown that warm application was more successful than placebo in reducing pain in patients with acute and sub acute lumbar pain, and cold application provided pain control in the acute phase and reduced the muscle tension³².

HP therapy has long been used as a component of pain managements in physical therapy^{33,34}. HP has been used by physical therapists for many years, its physiological effects and clinical benefits have not been fully established, and it is used as an auxiliary treatment. HP is regarded as a routine treatment, and as such, the effect of HP needs to be studied²⁵. All the above study strongly supports our result.

CONCLUSION

This study provides evidence that adding lumbar K-Tape to a conventional LBP program consisting of standardized exercises is more effective in the treatment of chronic mechanical LBP in terms of ROM, pain, and functional level.

LIMITATIONS

However there were few limitations that hindered more accurate results such as the sample size was small consisting of only male patients. Similarly duration of study was short which leads to investigate short term effects only.

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