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
Received 15 November 2018, Accepted 22 November 2018

Please cite this article as: Shamsi S et al., Efficacy of K-Tape in Chronic Mechanical Low Back Pain . American Journal of Pharmacy & Health Research 2018.
INTRODUCTION

Low back pain is an extremely common health problem and most of the subjects experience it at some point of their life. 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%. Nachemson 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 structures. 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%. Another study found the prevalence of back pain among Saudi school workers in the city of Jeddah, Saudi Arabia was 26.2%. The prevalence of LBP is highest among women and individuals aged 40–80 years. 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. 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. When applied to the patient’s trunk, KT increases active lumbar flexion. The recommended physiotherapy management for LBP comprises a wide range of treatment strategies, including electrotherapy, manual therapy, cognitive behavioral therapy, and exercise. Exercise has also been widely applied by physiotherapists in clinical settings to treat LBP. Exercise therapy focuses on the prescription of muscular contraction and body movement to improve overall health. 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 intensity. 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 criteria

- 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

- 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 day\textsuperscript{22}. 

**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 paravertebrally 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)\textsuperscript{22,23}.

![Fig.1 I shape K-Taping](image1.png) ![Fig. 2- flexion of spine](image2.png)

**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 extension\textsuperscript{22}. 

[www.ajphr.com](http://www.ajphr.com)
Moist Hot Pack Technique:
MHP was applied for 20 min\textsuperscript{24} which was preheated for at least 24 hours in a hydro collator at 85\textdegree{} to 90\textdegree{} 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 only\textsuperscript{25}.

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 PSMMC. 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\textsubscript{x} to Post R\textsubscript{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 Mean±SD | Post Rx Mean±SD | Pre Rx to Post Rx Mean±SD | Paired T value | p value |
|-------------------------|----------------|----------------|---------------------------|----------------|---------|
| Group A (N=15)          | 7.50±1.21      | 0.71±0.37      | 2.32±0.34                 | 12.25          | 0.003   |
| Group B (N=15)          | 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 Mean±SD | Post Rx Mean±SD | P Value |
|-------------------------|----------------|----------------|---------|
| Group A (N=15)          | 41±18.16       | 8±4.49         | 0.000   |
| Group B (N=15)          | 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\textsuperscript{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 spine\textsuperscript{27}.

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 pain\textsuperscript{28}.

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 pain\textsuperscript{22}.

Law ford et al. 2016 study was designed to reduce lower back pain with two different exercise types\textsuperscript{29}.

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 group\textsuperscript{30}.

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 study\textsuperscript{31}.

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 tension\textsuperscript{32}.

HP therapy has long been used as a component of pain managements in physical therapy\textsuperscript{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 studied\textsuperscript{25}. 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.

REFERENCES

1. Aure O, Nilsen J, Vasseljen O. Manual therapy and exercise therapy in patients with chronic low back pain: A randomized, controlled trial with 1-year follow-up. Spine 2003; 28:525-532.
2. Carey TS, Evans AT, Hadler NM, et al. Acute severe low back pain: a population-based study of prevalence and care-seeking; Spine 1996; 21(3):339-344.
3. Mondal M, Sarkar B, Alam S, Das S, Malik K, Kumar P et al. Prevalence of Piriformis Tightness in Healthy Sedentary Individuals: A Cross-Sectional Study. International Journal of Health Sciences & Research 2017, Vol.7; Issue: 7; July; 134-142.
4. Cohen SP, Argoff CE, Carragee EJ: Management of low back pain. BMJ 2008, 337.
5. Al-Arfaj, A., S. Al-Saleh, S. Alballa, A. Al-Dalaan S. Bahabri, M. Al-Sekeit and M. Mousa,. How common is back pain in Al-Qaseem region. Saudi Med. J 2003., 24: 170-3.
6. Abalkhail, B.A., A.A. Bahnassy and T.M. Ghabrah,. Low back pain among Saudi school workers in Jeddah. Saudi Med J. 1998, 19: 491-5.
7. Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014; 73:968–74.
8. Koes BW, van Tulder M, Lin CW, et al. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. Eur Spine J 2010; 19:2075–94.
9. Ladeira CE. Evidence based practice guidelines for management of low back pain: physical therapy implications. Rev Bras Fisioter2011;15:190–9.
10. Kase K, Tatsuyuki H, Tomoki O. Development of KinesioTM tape. In: Kase K, Tatsuyuki H, Tomoki O, editors. KinesioTM Taping Perfect Manual. Kinesio Taping Association; 1996. p. 117-8.
11. M. PAOLONI 1, A. BERNETTI 2, G. FRATOCCHI et. al, Kinesio Taping applied to lumbar muscles influences clinical and electromyographic characteristics in chronic low back pain patients, EUR J PHYS REHABIL MED 2011; 47:237-44
12. Yoshida A, Kahanov L. The effect of kinesio taping on lower trunk range of motions. Res Sports Med 2007;15:103-12.
13. Nor Azizah Ishak, Zarina Zahari, and Maria Justine, Effectiveness of Strengthening Exercises for the Elderly with Low Back Pain to Improve Symptoms and Functions: A Systematic Review, Hindawi Publishing Corporation Scientifica, 2016, 1-10.
14. M. VanTulder, A. Malmivaara, R. Esmail, and B. Koes, “Exercise therapy for low back pain: a systematic review within the framework of the cochrane collaboration back review group,” Spine 2000, vol. 25, no. 21, pp. 2784–2796.
15. J. Tan and S. E. Horn, Practical Manual of Physical Medicine and Rehabilitation: Diagnostics, Therapeutics, and Basic Problems, Mosby 1998, St Louis, Miss, USA.
16. Emela Mujic Skikic, Trebinjac Suad, The Effects of Mckenzie Exercises for Patients with Low Back Pain, Our Experience, Bosnian J Basic Medical Sciences 2003,III (4), 70-75.
17. McKenzie, Treat your own back, Spinal publications LTD 1995., New Zeeland.
18. Donelson R (1990), The McKenzie approach to evaluating and treating low back pain, Orthopedic review 1990 VOL XIX, No 8.
19. Jung-Seok Lee, Suh-Jung Kang, The effects of strength exercise and walking on lumbar function, pain level, and body composition in chronic back pain patients, Journal of Exercise Rehabilitation 2016; 12(5):463-470.
20. Priya Singh Rangey, Megha S. Sheth, Neeta J. Vyas, Comparison of Immediate Effect of Two Different Maitland Mobilization Protocols on Pain and Range Of Motion in Subjects with Osteoarthritis of Knee, IJMHR, 2015, 1(2), 26-29.
21. Melzack R, Wall PD. Pain mechanisms: a new theory Science 1965; 150:971-979.
22. Nilanjan Sarkar, Bibhuti Sarkar, et. al, Efficacy of Kinesio-Taping on Pain, Range of Motion and Functional Disability in Chronic Mechanical Low Back Pain: A Randomized Clinical Tria, International Journal of Health Sciences & Research, 2018, 8 (7), 105-112.
23. Kase K, Wallis J, Kase T. Clinical Therapeutic Applications of the Kinesio Taping Method. Tokyo, Japan 2003, Keni -Kal information.
24. Nilay Şahin, Ali Yavuz Karahan, İlknur Albayrak, Effectiveness of physical therapy and exercise on pain and functional status in patients with chronic low back pain: a randomized-controlled trial, Turk J Phys Med Rehab 2018;64(1):52-58.
25. Mee-Young KiM, Ju-HYun KiM, et. al Temporal Changes in Pain and Sensory Threshold of Geriatric Patients after Moist Heat Treatment, J.Phys.Ther. Sci 2011, 23: 797-801.

26. Information guide authentic Kinesio designed and authorised by Kezo Kase.

27. Kenzo Kase, Jim Wallis, Tsuyoshi Kase: Clinical Therapeutics Applications of the Kinesio Taping Method, 2nd edition 2003.

28. Sanchez AMC, Palomo ICL, Penarrocha GAM, Sanchez MF, Labraca NS and Manuel Morales A. Kinesio Taping reduces disability and pain slightly in chronic non-specific low back Pain: a randomized trial. Journal of Physiotherapy 2012, 58(2):89-95.

29. Lawford BJ, Walters J, Ferrar K. Does walking improve disability status, function, or quality of life in adults with chronic low back pain? A systematic review. Clin Rehabil 2016;30:523-536.

30. Kumar T, Kumar S, Nezamuddin M, Sharma VP. Efficacy of core muscle Strengthening Exercise in Chronic Low Back Pain Patients. J Back and Rehabilitation 2014. 28(4):699-707.

31. Rainville J, Sobel J, Hartigan C, Monlux G, Bean J. Decreasing disability in chronic back pain through aggressive spine rehabilitation. J Rehabil Res Dev 1997;34:383.

32. Shahbandar L, Press J. Diagnosis and Nonoperative Management of Lumbar Disk Herniation Oper Tech Sports Med 2005;13:114-21.

33. Kaada B, Torsteinbø O: Vasoactive intestinal polypeptides in connective tissue massage. With a note on VIP in heat pack treatment. Gen Pharmacol, 1987, 18: 379–384.

34. Weinberger A, Fadilah R, Lev A, et al.: Intra-articular temperature measurements after superficial heating. Scand J Rehabil Med, 1989, 21: 55–57.