Original Article

# EFFECTIVENESS OF KINESIOTAPING IN IMPROVING PAIN, LUMBAR EXTENSION RANGE OF MOTION AND DISABILITY IN PATIENTS WITH CHRONIC NON SPECIFIC LOW BACK PAIN

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## ABSTRACT

**Background:** Various treatment methods have been used to improve pain, back-specific disability such as manual therapy, back school therapy, strengthening and stretching exercises, kinesio Taping (KT) and various treatment modalities. The discrepancy in the outcome of many studies creates doubts that whether or not Physical Therapy have a positive impact on improving pain and back specific disability. Kinesio Taping is a novel technique which is said to improve pain and disability in subjects with Non-specific low back pain. In spite of KT popularity, the efficacy of its technique has not been adequately researched. **Purpose of the Study:** To find out whether there is any difference in effectiveness of kinesio Taping in conjunction with conventional therapy as compared to conventional therapy alone in improving low back pain, lumbar extension range of motion and back-specific disability. **Methods:** 30 subjects were randomly assigned into two groups. Group 1(n=15) subjects received conventional therapy, Group B (n=15) subjects received Kinesio Taping in conjunction with conventional therapy for 4 weeks. The treatment was given for 1 session per week for 4 weeks and effects were recorded at 2nd and 4th week after intervention. **Result:** Independent 't' test was used for between group analysis and repeated measure ANOVA is used for within group analysis. ANOVA was followed by Post-hoc Newman Keuls test to find out the significance of mean difference for between group comparisons. Subject in KT group showed better and significant results than conventional group in all parameters at 4th week. **Discussion & Conclusion:** In the present study we found that there was significant improvement in VAS and RMQ in KT group than conventional group. There was a significantly higher improvement of 61.2% and 61.5% in VAS (back pain) and RMQ (back-specific disability) respectively in KT than conventional group. The improvement in lumbar extension range of motion improved 52.4% higher in patients those who received the Kinesio Taping in conjunction with Conventional therapy than those who received the Conventional therapy alone, but did not reach the statistical significance. **Brief Summary and Potential Implications:** The present study thus, suggests physiotherapists to use Kinesio Taping in conjunction with Conventional therapy in clinical practice for management of patients with Chronic Non-specific Low Back Pain.

**KEYWORDS:** Chronic Non Specific Low Back Pain; Core Stability Exercise; Patient Education; Kineso Taping.

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## INTRODUCTION

Low back pain (LBP) is an extremely common problem that most people experience at some point in their life.[1] It is the leading cause of activity limitation and work absence throughout much of the world and it causes and enormous economic burden on individuals, families, communities, industry and governments.

In India, occurrence of LBP is also alarming. Nearly 60% of the population has significant back pain at some time in their life.[2]

Non-specific low back pain" [NSLBP] is defined as, low back pain that is not attributable to a recognizable or known specific pathology – bone disorder in the spine [fracture], radicular nerve compression, slipped intervertebral disk, stenosis in lumbar spine, inflammatory disorder of spine [ankylosing spondylitis], cauda equine syndrome, congenital back disorder, infection in the spine [discitis], tumour in lumbar area, osteoporosis, meningitis, Cancer, HIV, autoimmune disorder [RA].[3,4]

There is little scientific evidence on the prevalence of Chronic non-specific low back pain [CNSLBP], the best estimates suggest that the prevalence is approximately 23%. [(3).] Diagnostic triage is used to distinguish those patients with non spinal or serious spinal disorder from those with pain of musculoskeletal origin by means of history and examination with particular emphasis on red flags.[5,6]

Numerous systematic reviews have synthesized the available evidence for most common intervention and these reviews suggests that current approaches do not provide substantial long term answer to the problem.[7]

Kinesio Taping [KT] is a novel technique that is theorized to be an effective treatment for musculoskeletal disorders. Evidence suggests possible role of KT in management of Nonspecific low back pain, but available literature is scantly as well as centric over immediate effects. Thus further research is required to validat e t he effects of Kinesio T aping in "Non Specific Low Back Pain".

## PURPOSE OF THE STUDY

To lessen the controversy in therapy selection and to find out the effectiveness of newer techniques in improving back pain and back specific disability in Chronic Non specific Low Back Pain.

## SUBJECTS & METHODS

Ethical clearance was obtained from Ethical committee, ISIC Institute of Rehabilitation Sciences. Subjects diagnosed as "Chronic Non specific low back pain" by an Orthopaedican were informed about the research study , subjects who volunteer to participate in the study and who met the eligibility criteria were included after taking written consent. Subjects were selected fom Pt. Deendayal Upadhayay Institute for the Physically Handicapped and ESI Hospital Basaidarapur, India.

**Inclusion Criteria**

1. Age : 20-50 Yrs
2. Male or Females
3. Diagnosed with non specific low back pin
4. Duration > 3 months [(3)]
5. Able t o read and understand English

**Exclusion Criteria**

1 . Patient diagnosed with any of the followings:
   i. Bone disorder in the spine (fracture)
   ii. Radicular nerve compression
   iii. Slipped intervertebral disc
   iv. Stenosis in lumbar spine
   v. Inflammatory disorder (ankylosing spondylitis)
   vi. Cauda equine syndrome
   vii. Congenital back disorder
   viii. Infection in the spine (discitis)
   ix. Tumour in lumbar area
   x. Osteoporosis
   xi. Meningitis
   xii. Red flags [5,6]
   xiii. HIV
2. Known skin allergies
3. Previous spinal surgery or scheduled spinal surgery.
4. Unwillingness to trim body hair when required
5. Serve pain on VAS.

**Procedure:**

**PROTOCOL**

Group A received conventional therapy consisting of core stability exercises and patient education[8] and Group B received KT and conventional therapy same as Group A. Intervention was followed for 4 weeks with exercises for 5 days per week; 1 contact session & 4 home exercise session per week.[9]

**CORE STABILITY EXERCISE PROTOCOL (4 week)**

Week 1: "Contracting core muscles"

Dosage : 30 contractions, twice per day for 5 days per week.

Home exercises: patient lies supine and practices contraction using self palpation.

Week 2: "Endurance contractions"

Home exercises: endurance contraction supine, sitting, kneeling, standing and then in ADLs movements

Dosage: 30 contraction of 1 minute in each position and ADL Movements; once a day for 5 days a week

Week 3: "Stability contraction"

Pelvic bridging - 3 reps of 10 sec hold; thrice a day for 5 days per week)

Leg slides - (1 set of 10 slides per leg; thrice a day for 5 days per week)

Single leg & arm raises (supine) - 1 set 10 raises each side+ opposite limb; thrice a day for 5 days per week.

Quadriped with alternate arm & leg raise - 1 set 10 raise each side+ opposite limb; thrice per day 5 days per week.

Segmental rotation - 1 set 10 rotation to each side ;thrice per day

Week 4: "Stability contractions & ADL training"

Continue use of exercises as performed in week 3 as well as specific functional training on those ADL movements which have previously given t he patient most trouble.

**Kinesio Taping Protocol**

Subjects in Intervention group were taped using a "Y" method proposed for sacrospinalis or erector spinae muscle. Y"strip was applied from origin of sacrospinalis to the insertion as theorized to support muscle function. [10,11]

Kinesiotape was reapplied once per week post exercise using "Y" technique for low back pain.

Fig:1 KINESOTAPING applied on lower back.

## DATA ANALYSIS

The data were summarized as Mean ± SD. The groups were compared by repeated measures analysis of variance (ANOVA) using general linear models (GLM) and the significance of mean difference within and between the groups was done by Newman – Keuls post hoc test after ascertaining normality by Shapiro-Wilk's test and homogeneity of variances by Levene's test. In between Groups analysis was done by independent Student's t test. A two-sided (a=2) $p<0.05$ was considered statistically significant. All analyses were performed on SPSS (version19.0) software.

## RESULTS

### VAS

**Graph 1.** Showing in within group analysis for VAS.

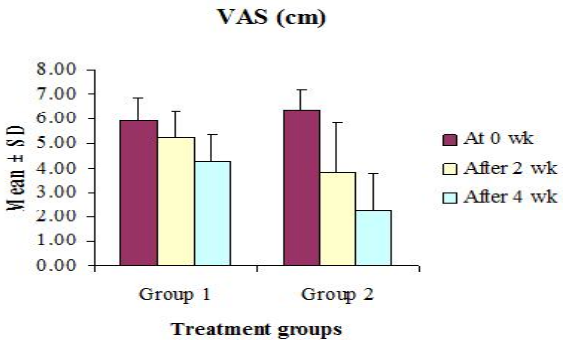


**Table 1:** For each group, comparison (p value) of mean VAS levels between the periods (i.e. within groups) by Newman Keuls test.

| Comparisons | Group 1 | Group 2 |
|---|---|---|
| At 0 wk to After 2 wk | 0.073 | p<0.001 |
| At 0 wk to After 4 wk | p<0.001 | p<0.001 |
| After 2 wk to After 4 wk | 0.013 | p<0.001 |

Comparing the mean VAS levels within the groups (Table 1 and Fig. 1), the VAS levels in Group 1 did not decreased significantly ($p>0.05$) at 2 wk as compared to 0 wk. However, at 4 wk it decreased (improved) significantly ($p<0.05$ or $p<0.001$) as compared to both at 0 wk and 2 wk. In contrast, in Group 2, it decreased significantly ($p<0.001$) at both 2 wk and 4 wk as compared to 0 wk.

### MMSM

Comparing the mean MMSM levels within the groups (Table 2, and Fig. 1.2), the MMSM levels in Group I did not increase significantly ($p>0.05$)

at both 2 week and 4 week as compared to 0 week, however, it increased significantly ($p<0.05$) at 4 week as compared to 2 wk. In contrast, in Group 2, it increased significantly ($p<0.01$) or $p<0.001$) at 4 wk as compared to both 0 week and 2 wk.

**Graph 2:** Graph showing within group comparison for MMSM.

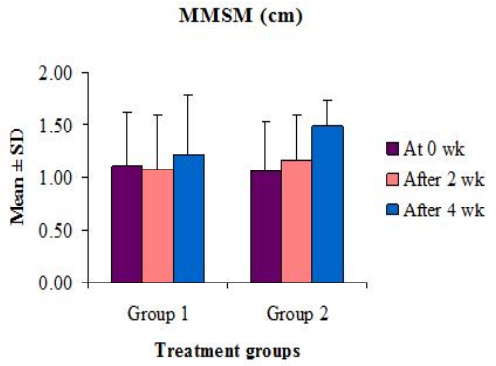


**Table 2:** For each group, comparison (p value) of mean MMSM levels between the periods (i.e. within groups) by Newman Keuls test.

| Comparisons | Group 1 | Group 2 |
|---|---|---|
| At 0 wk to After 2 wk | 0.494 | 0.153 |
| At 0 wk to After 4 wk | 0.063 | p<0.001 |
| After 2 wk to After 4 wk | 0.017 | 0.001 |

## RMQ

**Graph 3:** Graph showing within group comparison RMQ

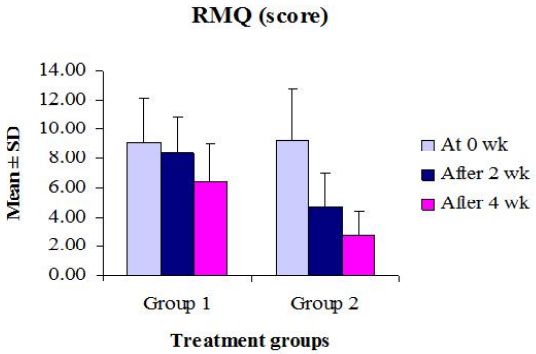


**Table 3:** For each group, comparison (p value) of mean RMDQ scores between the periods (i.e. within groups) by Newman Keuls test.

| Comparisons | Group 1 | Group 2 |
|---|---|---|
| At 0 wk to After 2 wk | 0.16 | p<0.001 |
| At 0 wk to After 4 wk | 0.001 | p<0.001 |
| After 2 wk to After 4 wk | 0.016 | 0.003 |

Comparing the mean RMQ scores within the groups (Table 3 and Fig. 1.3), the RMQ scores in Group 1 decreased (improved) significantly ($p<0.05$ or $p<0.001$) at 4 wk as compared to both 0 wk and 2 wk, while not decreased significantly ($p>0.05$) at 2 wk as compared to 0 wk. In contrasts, in Group 2, it decreased significantly ($p<0.001$) at both 2 wk and 4 wk as compared to 0 wk.

## DISCUSSION

In the present study we found that there was significant improvement in VAS and RMQ in KT group than conventional group. There was a significantly higher improvement of 61.2% and 61.5% in VAS (back pain) and RMQ (back – specific disability) respectively in KT than conventional group.

According to Kenzo Kase, KT alleviates pain and facilitates lymphatic drainage by microscopically lifting the skin. The taped portion forms convolutions in the skin, thus increasing interstitial space. The result is that pressure and irritation are taken off the neural and sensory receptors, alleviating pain. Pressure is gradually taken off the lymphatic system, allowing it to drain more freely.[12]

A further possible mechanism by which KT induced these changes may be related to neural feedback received by the participants, which may improve their ability to reduce the mechanical irritation of soft tissues when moving the lumbar spine (Kase et al).

Castro Sanchez et. al ;conducted a study on people with CNSLBP of mechanical etiology to compare the short term effects of KT vs placebo tape application to the lumbar spine. KT was applied to lumbar spine (interventional) for 1 week; control intervention was sham taping. Pain, disability, trunk muscle endurance as an outcome measure were measured at baseline, immediately after week with tape in situ, and 4 weeks later. Concluded that KT reduced disability and pain in people with CNSLBP, but these effects may be to small to be clinically worthwhile. [13]

Gonzalez Enuso, J.R. in his study examined the effect of KT in improving pain and functionally in 8 subjects with NSLBP. As a result of this, it was found that KT does'nt seem to be effective, whereas, exercise therapy improved moderately

the disability and pain of participants. But as this study was conducted on a small sample size of 8 hence it was not enough to get proper conclusion.[4]

In present study, effectiveness of KT in conjunction with conventional therapy in improving pain was assessed on 30 patient and as a result of taping pain was found to be significantly improved by 61.2% at 2nd and 4th week at completion of therapy.

In present study, back-specific disability was improved following application of KT in conjunction with conventional therapy by 61.5%

Free-ending unmyelinated nerve fibers are abundant around joint capsules, ligaments, and the outer parts of the intaarticular menisci. They mediat e pain when a joint is strained and operate in excitatory reflex to protect the capsule. Kinesio Tape can improve joint function by stimulating the proprioceptors within the joint by application over the ligaments and biomechanically supporting the joint. The proprioceptors in the ligaments and joint capsules provide information to the nervous system t hat allows t he musculoskeletal system to provide the appropriate perception of support and movement to the injured joint and provide feedback into the tissues/joints they heal.[12,15]

Castro Sanchez et. al (2012) Conducted a study on people with CNSLBP of mechanical etiology to compare the short term effects of KT vs placebo tape application to the lumbar spine. KT was applied to lumbar spine (intervention) for 1 week ; control intervention was sham taping. Pain, disability, trunk muscle endurance as an outcome measure were measured at baseline, immediately after week with tape in situ, and 4 weeks later. Concluded that KT reduced disability and pain in people with CNSLBP, but these effects may be to small to be clinically worthwhile. [14]

However, Paolini etal; conducted study to determine the effect of KT on pain, disability and lumbar muscle function in patient with chronic LBP both immediately and 1 month following examination and concluded that KT leads to pain relief and lumbar muscle function normalization shortly after its application and these effects persists over a short follow up period. [14]

The improvement of back-specific disability in present study following KT application in conjunction with conventional therapy can be due to decrease in pain and re-appearance of flexion-relaxation phenomenon which may result in normalization of lumbar muscle function by providing correct sensory feedback, resulting in decrease in fear of movement and thus improving lumbar muscle function.[17,18]

The improvement in lumbar extension range of motion improved 52.4% higher in patients those who received the Kinesio Taping in conjunction with Conventional therapy than those who received the Conventional therapy alone, but did not reach the statistical significance.

According to Kenzo Kase, the elastic properties of kinesiotape when applied using the Kinesio Taping Method enhances the function of muscle fibers. Recoil of the tape influences the muscle units called sarcomeres to elongate or shorten thus influencing muscle contractions. Golgi Tendon Organs (GTO) are specialized mechanical receptors that are found throughout muscle and tendons. Stimulation of the GTO by direct pressure has been well documented by Rood and others to inhibit muscle over activation. Research has also revealed that the GTO is responsible for controlling the muscle spindle throughout movement. It modulates and modifies tension of the muscle in direct responses from feedback about the antagonist muscle to create controlled coordinated motion. The skilled application of KT can immediately influence muscle balance and contraction.[12]

In present study, Y technique of KT helps inhibit the muscle function to provide relaxation and for inducing rebounding proprioceptive feedback in opposite directions of contraction (applied from insertion to origin) in overhead and stretched erector spinae in patients with NSLBP, thereby resulting in improvement in lumbar extension range of motion.

**Limitation of the study**

1. Small sample size
2. Meningitis : none of the clinical signs or tests which are meant for excluding patients with meningitis were included in the study.

Recommendations for further research

1. More trials with large sample size are needed to validate the findings of this study.
2. Deserves investigation in future randomized control trials to draw conclusions on its longer-term effects EMG studies are lacking to validate the efficacy of KT in patients with low back pain.

## CONCLUSIONS

The present study hypothesized that Kinesio Taping in conjunction with Conventional therapy will be significantly more effective than Conventional therapy alone and the hypothesis was found to be true.

The present study thus concluded that Kinesio Taping is effective in the management of "chronic non specific low back pain" and suggests physiotherapists to use Kinesio Taping in conjunction with Conventional therapy in clinical practice.

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### Declaration of Conflicting Interests

No individual or commercial party have a direct financial interest in the results of the research or will confer a benefit upon the author(s) or upon any organisations with which the author(s) are associated.

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