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ORIGINAL ARTICLE

EFFICACY OF KINESIO TAPPING ALONG WITH CONVENTIONAL PHYSICAL THERAPY AND CONVENTIONAL PHYSICAL THERAPY ALONE FOR THE TREATMENT OF ACUTE LOW BACK PAIN: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

OBJECTIVE: To compare the efficacy of Kinesio Taping (KT) in addition to conventional Physical therapy (CPT) with CPT alone for the treatment of patients with acute low back pain.

METHODS: This study was conducted in Peshawar, Pakistan from Jan to June 2019. A total of 56 patients with acute LBP, selected through a convenient sampling technique were randomly allocated to the experimental group, KT along with PT (n=28), or the control group, conventional PT alone (n=28). Participant allocation was concealed using sequentially numbered, opaque, sealed envelopes. Both groups received treatment for two weeks. Oswestry disability index (ODI) and numeric pain rating scale (NPRS) were used for the measurement of outcomes.

RESULTS: Out of 56 participants, 34 (60.7 %) were male and 22 (39.3%) were females. The majority (n=40; 71.4%) were aged between 30 and 50 years and mean age of patients was 44.36±8.73 years. Pre- & Post-treatment pain score on NPRS was 8.32±.612 and 4.50±1.599 for experimental and 8.21±.630 & 5.29±1.213 for control group respectively ($p<0.001$). Pre- & Post-treatment ODI score was 31.54±3.339 & 20.86±2.649 for experimental and 30.68±2.653 & 22.64±2.542 for control group respectively ($p<0.001$). Pre- & Post-treatment Disability in percentage (ODI score* 100/50) was 62.50±6.221 & 41.54±6.741 for experimental and 61.36±5.307 & 45.29±5.083 for control group respectively ($p<0.001$).

CONCLUSION: Current study suggests the efficacy of therapeutic KT and conventional PT on reduction in pain intensity and functional disability in patients with acute LBP as compared to PT alone for the management of acute LBP.

Clinical Trial Registry Number: NCT05015842

KEYWORDS: Low Back Pain (MeSH); Kinesio tapping (Non-MeSH), Conventional physical therapy (Non-MeSH); Oswestry disability index (Non-MeSH); Numeric pain rating scale (Non-MeSH); Pain Measurement (MeSH); Pain (MeSH); Rehabilitation (MeSH); Physical Therapy Modalities (MeSH).

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INTRODUCTION

Low back pain (LBP) is globally one of the leading causes of disability which affects all age groups.[1] According to a study LBP is predicted by overweight, lacking formal education, lacking regular exercise, sedentary lifestyle, abnormal posture, smoking, and alcohol consumption.[2] In India and Brazil, the annual prevalence of LBP was reported as 51% and 48.1% respectively.[3,4] Prevalence of LBP in Pakistan has been reported as 40.6% in elderly population.[5] Different studies reported different treatment options for LBP including medication,[6] conventional physical therapies, mechanical diagnosis and therapy,[7] lumbar stabilization exercises,[8] and behavioral cognitive therapy.[9] Among therapists, new methods of treatment are evaluated including Kinesio Taping (KT).

KT is a thin sticky and stretchable material that can be stretched up to 120 to 140%.[10] It is commonly used by physical therapists for the treatment of both acute and chronic LBP despite the fact it has negative recommendations.[11] A study reveals that KT is not only effective in reducing pain intensity in patients with LBP but also improves the endurance of the muscles of the back.[12] KT when applied at low tension reduce the muscle pain significantly and when applied at no, low or high tension reduce muscle sensitivity.[13] KT not only reduced the pain intensity quickly when applied with tension in a patient with LBP but also it had a positive impact on quality of life.[14] A recent meta-analysis revealed that KT application effectively reduces the pain intensity and improves disability when applied to any region of the body and specifically when applied five times in patients with LBP it significantly reduces the disability.[15] Another meta-analysis also reported a significant effect of KT on pain reduction in the shoulder region.[16] KT reduced pain intensity after three days of its application and improves disability after three and ten days among patients with LBP.[17] There was more decrease in pain

intensity among patients with LBP when KT was added to core stability exercises.[18]

A meta-analysis reported that according to the evidence of low to moderate quality KT was neither better effective than no intervention or placebo nor it was effective when used as an adjunct with other interventions in the management of LBP and the authors didn't find any evidence which favours the use of KT in management of LBP.[19] The findings of another meta-analysis show low-quality and inconclusive evidence in support of KT as an effective treatment option in the management of LBP.[20]

The advantage of KT is that it is safe, convenient, easy to apply, and it can be a viable alternative for many patients who are contraindicated to other alternatives, such as manipulations, medications or exercises. The application of KT also may increase the chances of a quick recovery and may help patients cope better with their pain. Additionally, the application of KT may enhance the performance of functional activities. But as mentioned above few studies from the literature search show clinical significance in favour of KT while few studies reported no clinical benefits from KT. Therefore, this trial was designed to validate the efficacy of KT along with and without conventional physical therapy for the treatment of patients with acute LBP.

METHODS

Trial design: This was a two-armed parallel randomized control trial.

Participants: Participants were recruited from two hospitals and one private clinic i.e. Bibi Zahida Memorial Hospital Peshawar, Khyber Teaching Hospital (KTH) Peshawar, and Care & Cure Physical Therapy Clinic Peshawar, Pakistan respectively.

The study was conducted from Jan to June 2019. Study participants were selected through a convenient sampling technique. All patients were subjectively examined by the assessors for the inclusion and exclusion criteria. Patients of both genders and aged 18 or above years having LBP with a history of less than 3 months were included in the study.

Patients having diagnosed conditions of spondylolisthesis, spondylosis, lumbar stenosis, spinal tumour, lumber fracture, renal disease and trauma were excluded from the study. Each participant in the experimental group was assessed for any allergy reaction of the skin to KT. Patients either with chronic LBP (duration more than 3 months) or contraindicated to KT (skin allergy or pre-existing skin lesion or infection) were also excluded. Female antenatal patients were also excluded from the study.

Sample Size: The sample size was estimated as 56 including 28 each in the experimental group (Kinesio taping in addition to conventional physical therapy) and control group (conventional physical therapy only) Sample size was calculated through an online calculator where patients with acute LBP in the experimental groups were predicted to improve 30% from baseline data on the planned outcome.

Randomization & Allocation concealment: A total of 56 patients were randomly allocated to the experimental group (Kinesio Tapping along with conventional physical therapy; n= 28) and control group (conventional physical therapy alone. n=28) through a computer-generated randomized table in Microsoft excel by an analyst who was not involved in the recruitment or measurement procedures. Participant allocation was concealed using sequentially numbered, opaque, sealed envelopes.

Interventions: The experimental group was treated with conventional physical therapy along with KT while the control group was treated by only conventional physical therapy protocol for 2 weeks. All participants were instructed to leave the tapes attached until the next intervention.

Conventional Physical Therapy: Both groups received conventional physical therapy treatment consisting of therapeutic exercise, heat therapy and manual therapy. All the patients received manual therapy techniques that included joint mobilization and therapeutic exercise that included piriformis stretching as well as bridging exercises to strengthen the core stability muscles (i.e., strengthening of transverses abdominis, erector spinae and lumbar multifidus). All the exercises were performed by the physical therapist. Every patient received conventional PT once a week. The experimental group received conventional PT after the tapping procedure on the same day of tapping. The session of mobilization was consisting of two sets with 30 repetitions of grade 2 anteroposterior central glides to the lumbar spine. Strengthening exercises were consisting of two sets with a duration of 30 seconds for each set and 10 seconds of break between the sets.[21] The stretching of piriformis was performed in two sets. The stretched muscle was held for 30 seconds in each set.[21] Heat therapy through placing an electric heating pad under the low back was provided for two weeks to all the patients once a week and was applied for 20 minutes in each session. All the exercises were performed by the physical therapist and then all participants were instructed to do the muscle strengthening and stretching exercises at home, once a day however, these home exercises were not monitored. Assessment of all the participants was performed once a week followed for two weeks for disability and pain through the Oswestry disability index (ODI) and numeric pain rating scale (NPRS) respectively.

Kinesio Taping Application: The KT was applied to the back once a week with a treatment duration of 2 weeks. Each KT was applied for continuous three days and the next KT was applied after a break of two days. Each participant in the experimental group was assessed for any allergy reaction of the skin to KT.

For all participants, two I-shaped tapes of cure tape type black colour (width 5 cm) were applied to the erector spinae paravertebral muscles (bilaterally) parallel to the spinous processes of the lumbar spine. KT was applied according to the Kenzo Kaser KT manual. The participants assumed a sitting position on a chair without back support to allow forward bending while the therapist stood behind the participants. The KT

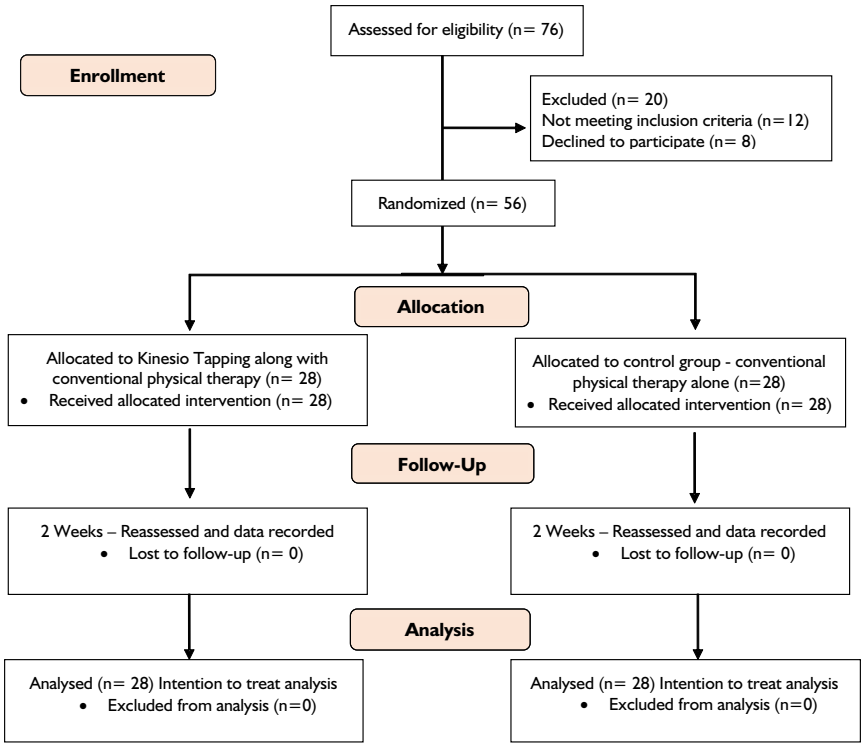

Figure 1: Methodology flow diagram of the study

was applied as the following; the initial anchor point of tape (4–5 cm) was carefully removed from its paper backing and applied to the posterior superior iliac crest without stretch. After that, the participant was asked to perform maximum trunk flexion and the tape was removed from the backing paper; the tape was applied in the shape of an "I" over the skin in the paravertebral region up to the T12 vertebra at 10% to15% stretch. The final anchor point of tape (4–5 cm) was fixed directly above the transverse process of the T12 vertebra without a stretch. The same procedure was then applied to the other side. The tape was rubbed by hand several times to warm the adhesive film to achieve adhesion.

Outcome Measures: The primary outcome was pain intensity which was measured through the Numeric Pain Rating Scale (NPRS), a 0–10 rating scale. In NPRS the 1 score means the least (minimum) intensity of pain and 10 means severe (maximum) pain and 0 means no pain). The secondary outcomes were functional disability using Oswestry Disability Index (ODI). The ODI questionnaire consisted of 10 items related to limitations in daily life activities (like personal care, lifting, walking, sitting, standing, sleeping, social life, travelling, and work). Each item includes six potential responses that are rated on a 0 to 5 points scale, with maximum scores of "5" or "total disability" and a minimum score of "0" or "no disability. The total score is calculated as follows: (patient's score/50) *100 to obtain the score expressed in percentage. The percentage was interpreted as 0% to 20%: minimal disability; 21%-40%: moderate disability; 41%-60%: severe disability; 61%-80%: crippled; 81%-100%: bed-bound.

All outcomes were measured at baseline and 2-week Post-intervention.

Study Registration: The study protocol was registered with clinicaltrials.gov PRS with the registration number NCT05015842. The study was also approved by the Advance Studies & Research Board (AS&RB) of Khyber Medical University (Study approval reference number: DIR/KMU-AS&RB/EK/000678). The study was ethically approved by the KMU Ethics Board (KMU-EB) (ethical approval reference number: DIR/KMU-EB/EK/000477). Data was collected from the patients after permission from the head/in-charge of each above-mentioned clinic and hospital. An information sheet was provided to all participants and a consent form in the Urdu language was also provided and signed by the willing participants. Baseline data was collected from all participants through an initial assessment before the treatment.

Data was statistically analyzed through SPSS version 25.0. Data was collected before and after 2 weeks of management. Kolmogorov–Smirnov test was used to determine the normality of data distribution. Normally distributed data were described as mean and standard deviation. For the age percentage, mean value ± SD and frequency were calculated. For gender percentages and frequency were calculated. Paired t-test was used to determine the differences in the

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Variables		Frequency (n=56)	Percentage
Gender	Male	136.70 (18.9)	134.79 (19.8)
	Female	84.03 (10.70)	84.10 (10.90)
Age (years)	< 30	149.6 (17.5)	156.2 (20.3)
	30 - 50	62.0 (14.0)	64.8 (14.1)
	> 50	30.0 (19.5)	29.3 (21.0)
Marital Status	Married	180.5 (32.0)	179.3 (31.0)
	Single	89.0 (25.6)	88.5 (24.4)
	Others (divorced or widowed)	45.4 (07.6)	45.6 (07.8)

TABLE II: PRE- AND POST-INTERVENTION PAIN AND DISABILITY MEASURES OF EXPERIMENTAL AND CONTROL GROUPS

Variables	Experimental [KT+CPT] (Mean±SD)	Control [CPT alone] (Mean±SD)	P Value
Pre-Pain score on NPRS (Before treatment)	8.32 ± 0.612	8.21 ± 0.630	0.521
Post-Pain score on NPRS	4.50 ± 1.599	5.29 ± 1.213	0.043
Pre-Disability in percentage (ODI score *100/50) (Before treatment)	62.50 ± 6.221	61.36 ± 5.307	0.463
Post-Disability in percentage (ODI score * 100/50) (After treatment)	41.54 ± 6.741	45.29 ± 5.083	0.022
Pre-ODI total score in 50 (Before treatment)	31.54 ± 3.339	30.68 ± 2.653	0.292
Post-ODI total Post-ODI score in 50 (After treatment)	20.86 ± 2.649	22.64 ± 2.542	0.013

KT: Kinesio Taping; CPT: conventional Physical therapy; NPRS: Numerical Pain Rating Scale; ODI: Oswestry Disability Index; ODI: Oswestry disability index

TABLE III: PAIRED T-TEST FOR PAIN AND DISABILITY MEASURES IN CONTROL AND EXPERIMENTAL GROUP

PAIN AND DISABILITY MEASURES		Experimental [KT+CPT]	Mean Differences (Mean ± SD)	Control [CPT alone]	Mean Differences (Mean ± SD)	P Value
Pain on NPRS	Pre treatment	8.32 ± 0.612	3.821 ± 1.565	8.21 ± 0.630	2.929 ± 0.940	<0.001
	Post treatment	4.50 ± 1.599		5.29 ± 1.213		
Disability in % (ODI score * 100/50)	Pre treatment	62.50 ± 6.221	20.964 ± 8.579	61.36 ± 5.307	16.071 ± 2.142	<0.001
	Post treatment	41.54 ± 6.741		45.29 ± 5.083		
ODI total score in 50	Pre treatment	31.54 ± 3.339	10.679 ± 4.439	30.68 ± 2.653	8.036 ± 1.071	<0.001
	Post treatment	20.86 ± 2.649		22.64 ± 2.542		

NPRS: Numerical Pain Rating Scale; ODI: Oswestry Disability Index

outcome measures within the two groups. An independent t-test was used to statistically assess the differences in the means of outcome measures between the experimental and control group. A P-value of <0.05 was considered statistically significant.

RESULTS

Out of 56 participants, 34 (60.7 %) were male and 22 (39.3%) were females. The majority (n=40; 71.4%) were aged between 30 and 50 years (Table I). The mean age of patients was 44.36±8.73 years. There was an overall improvement in the intensity of the pain in both the experimental and control group. After the treatment, the mean pain intensity on the NPRS in the experimental group decreased from 8.32±0.612 to 4.50±1.599 while in the control group the pain intensity also decreased from 8.21±0.630 to 5.29±1.213.

At the end of the trial, the post-treatment assessment revealed that there was an improvement in the disability on the ODI scale in both the experimental group and control group. A higher score on ODI scale means a more severe disability. In experimental group, the ODI score percentage decreased from 62.50±6.221 to 41.54±6.741 while in control group it decreased also from 61.36 ±5.307 to 45.29 ±5.083. (Table II).

Paired t-test analysis in the control group revealed that the outcome measures after the treatments in the control group were highly statistically significant paired t-test was used for the difference between the mean of pre-treatment and post-treatment outcomes in both experimental and control groups. Pre- & Post-treatment pain score on NPRS was 8.32±0.612 and 4.50±1.599 for experimental and 8.21±.630 & 5.29±1.213 for control group respectively (p<0.001). Pre- & Post-treatment ODI score was 31.54±3.339 & 20.86±2.649 for experimental and 30.68±2.653 & 22.64±2.542 for control group respectively (p<0.001) [Table III].

The independent t-test revealed that before the treatment there was no significant difference between the experimental and control group for pain intensity ($t_{53.954}$ =0.646, P-value: 0.521), disability in percentage (t52.691 = 0.740, P-value: 0.463) and disability total score on ODI ($t_{51.382}$ = 1.064, P-value: .292) while after the completion of the treatment the results revealed that there was more reduction in the experimental group in pain intensity i.e. there was a statistically significant difference between the means ($t_{50.347}$ = 2.072, P-value: 0.043), as well as there, was more improvement in disability in experimental group measurement on ODI ($t_{50.204}$ = 2.350, P-value: 0.022) as

TABLE IV: COMPARISON FOR PAIN AND DISABILITY BEFORE AND AFTER THE TREATMENT BETWEEN EXPERIMENTAL AND CONTROL GROUP

Experimental vs Control group	Difference between experimental and control group (Mean±SD)	P Value
Pre-pain on NPRS out of 10	0.107	0.521
Post-pain on NPRS out of 10	0.786	0.043
Pre Disability in percentage (ODI score * 100/50)	1.143	0.463
Post Disability in percentage (ODI score * 100/50)	3.750	0.022
Total score out of 50 before the treatment	0.857	0.292
Total score out of 50 after the treatment	1.786	0.013

Significant difference (P<0.05); NPRS: Numerical Pain Rating Scale; ODI: Oswestry Disability Index

compared to control group (Table IV).

DISCUSSION

Our study findings were favoring the use of KT along with conventional physical for treating patients with acute LBP as compared to conventional physical therapy alone. Literature review reveals that many studies consider KT as an effective and clinically significant treatment alternative while some studies reported that KT is not an effective treatment tool. In contrast to the results of the current research study, Amanda et al revealed that KT is not an effective alternative in managing patients suffering from non-specific low back pain.[22] The reason behind this unlike report may be the duration of treatment as in the current study the duration of treatment was only two weeks while in the study by Amanda and colleagues was four weeks and the follow-up of patients was for 6 months. This means that although KT is effective for short-term effects, however, for long-term effects KT is not an effective treatment option for LBP.

Marco Aurelio and his colleagues reported that there was a high level of satisfaction in both groups but there was lacking statistically significant variance between the groups.[23] The study was similar to the current study. Both studies compared KT in addition to physical therapy and physical therapy alone for the treatment of LBP but both studies have opposite conclusions. The KT produced irritation in some patients but it was reduced before the next session and didn't prevent the subjects from completing the study. Marco Aurelio and his colleagues concluded that KT in addition to other physical therapy treatments didn't alter the key outcomes.[23] In a meta-analysis, Brittney Bailey revealed that when KT was added to a conservative physical therapy program, it didn't add extra efficacy as compared to conservative therapy alone in patients with chronic LBP.[24]

Some studies reported similarities to the findings of the current study. Sathya and his colleagues suggested the use of KT as an effective treatment alternative. This study's outcome measures were the same as the current study i.e. pain and disability. The Sathya RP et al concluded with a conclusion similar to the current study that mechanical LBP was relived significantly with improvement in daily life activities when treated with KT and McKenzie extension protocol as compared to treated with McKenzie protocol only.[25] Another study by Bayram Kelle reported in favour of KT. He concluded that KT can provide significant improvements in both pain and disability in patients with acute non-specific LBP. The study revealed that KT is an effective treatment for acute LBP rather than chronic LBP.[26]

A study was conducted comparing the effects of KT and therapeutic exercises for patients with chronic LBP.[18] In the current study, KT with the same therapeutic exercises along with some other modalities were compared but the patients were with acute LBP. There were some variations in the protocol of KT application as well as number of sessions. The primary outcome was similar to the current study i.e. Pain intensity. There was more and significant improvement in the pain intensity in the group received KT along with therapeutic exercises which is similar finding to the current study. The authors recommended that a physical therapy management program with the addition of KT will be more effective in the management of Chronic LBP.[18]

It is summarized that several studies consider KT as an effective treatment option while others are in opposite of this statement. For short-term effects KT is effective and for the long-term, it may not be effective. KT should be applied for more than 5 sessions and follow-up for a longer duration should be performed. There are effective treatments other than KT also available for the management of LBP. The current study is in favour of KT as an effective alternative for the treatment of patients with acute low back pain when added to conventional PT.

LIMITATIONS OF THE STUDY

The study was conducted on a relatively small population and only short-term effects were observed. Large-scale studies are required for the long-term efficacy of KT in patients with acute LBP for pain intensity and disability.

CONCLUSION

The current study concludes that KT along with conventional physical therapy is more effective for treating patients with acute LBP as compared to

conventional physical therapy alone. LBP intensity can be reduced by tape application over the erector spinae muscle for only two weeks. There was more reduction in functional disability among patients with acute LBP when treated with KT along with conventional physical therapy. Statistically significant improvements were found in both groups regarding pain intensity and functional disability at the end of 2nd week of intervention. Overall both outcomes were significantly better in the Kinesio taping group. The current study suggests the efficacy of therapeutic KT and conventional PT on reduction in pain intensity and functional disability in patients with acute LBP as compared to conventional physical therapy alone for the management of acute LBP.

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AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

HB: Conception, acquisition of data, drafting the manuscript, approval of the final version to be published

HD: Study design, critical review, approval of the final version to be published

AB: Acquisition of data, drafting the manuscript, approval of the final version to be published

SK: Analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request