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ORIGINAL RESEARCH PAIN MANAGEMENT

Comparative analysis of Kinesio taping and dry-needling: effects on pain and disability in patients with mechanical low back pain

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ABSTRACT

Background & Objective: Low back pain (LBP) is an ever-increasing menace in the young men as well as women. Many factors causing it have been identified, the most common being improper spinal posture. LBP has been targeted by physicians, anesthetists, surgeons and rehabilitation medicine specialists. We compared the effects of Kinesio Taping and dry needling on pain reduction and disability improvement in patients diagnosed with mechanical chronic LBP.

Method: A randomized control trial (RCT) was conducted at Rawal General and Dental Hospital and Al-Nafees hospital in Islamabad from January 2020 to October 2021. Probability-based sampling method was used to select participants for the study (simple random sampling). Thirty patients, aged 18 to 75 y were included. Sample size was calculated with Epitools. The selected patients were divided in two groups i.e., 15 patients in the Kinesio taping group (KT group) and 15 in the dry needling group (DN group). Two patients in the needling group were dropped. Numeric Pain Rating Scale (NPRS) and Roland-Morris Disability Index Questionnaire (RMDQ) were used to assess the pain and the disability at baseline, two weeks post-intervention and four weeks post-treatment. Chi-Square test was use to find association.

Results: The mean age of the patients was 39.60 ± 13.69 y for KT group and 37.15 ± 12.54 y for DN group. The mean BMI for KT group was 27.15 ± 6.70 kg/m^2 and for DN group 27.52 ± 5.13 kg/m^2. Before treatment, there were no differences between the groups for NPRS and RMDQ. Both dry needling and Kinesio taping produced significant improvements in NPRS and RMDQ after two and four weeks of treatment ($P < 0.05$). However, statistical analysis results showed that there was no association between pain and disability in patient with non-specific low back pain. ($P > 0.05$).

Conclusion: Both, Kinesio taping and dry needling, significantly reduced pain and disability after two- and four-weeks treatment in patients with low back pain, but there was no statistical differences between the pain and disability in both groups.

Keywords: Disability; Dry Needling; Kinesio Tape; Low Back Pain; Numeric Pain Rating Scale; Physiotherapy

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1. INTRODUCTION

Low back pain (LBP) is the leading cause of disability.[1] It is the most common musculoskeletal disorder with a prevalence of upto 84%. Approximately 30% of the world community suffers from LBP and 80% report LBP at some point in their lives.[2] Acute LBP is defined as an episode lasting less than 1.5 months, sub-acute LBP as an episode lasting between 6 and 12 weeks, and chronic LBP as an event lasting three months or more. Chronic LBP is responsible for more than 80% of all medical costs.[3] Local data also showed that LBP is more common in the Pakistani population with obesity, prolonged sitting jobs, psychological disorders, lack of exercise, lack of health awareness, and heavy lifting jobs. Its prevalence is higher in urban than in rural areas.

Nonspecific LBP is a mechanical pain of musculoskeletal origin in which symptoms vary with the nature of physical activities. These patients represent approximately 85% of LBP patients presenting to primary care facilities.[4] It manifests as pain, muscle tension or stiffness that is localized below the costal margin and above the inferior gluteal folds and is not attributed to a specific pathology.[5, 6, 7] It is estimated that 80 to 90% of patients with acute LBP recover within six weeks.[5,8,9] However, 10 to 20% will develop chronic LBP (CLBP).[10-12] Approximately 70 to 80% of healthcare and social costs are attributed to the 10 to 20% of patients with CLBP.[10,13-16]

The aims of conservative treatment for LBP are to reduce pain, to improve activities of daily living (ADL) and to teach patients how to cope with the pain.[17] Kinesio taping (KT) is a conservative therapy for pain control in treating musculoskeletal disorders that has recently gained popularity. The KT technique has two concepts with different tensions when applied. Light (15-25%) pulling of the attachment-to-muscle method inhibits muscle function, while mild-to-moderate (25-50%) stretching of the attachment-to-muscle method inhibits muscle function. At attachment points, muscle function is activated.[18,19]

Dry needling (DN), is relatively a new method.[8,13] Direct insertion of acupuncture needles into the fascial trigger points (TPs) is a minimally invasive procedure.[15,16] It is done to check for TPs, either latent or active.

This study systematically compared the effects of Kinesio taping and dry-needling on pain intensity and functional disability in patients diagnosed with mechanical LBP. By elucidating the distinct mechanisms and therapeutic outcomes associated with each intervention, this research aims to contribute valuable insights into their respective roles in the multidisciplinary management. Ultimately, the findings from this comparative analysis can guide evidence-based practice, enhance treatment efficacy, and improve overall patient outcomes in this prevalent and debilitating musculoskeletal condition.

2. METHODOLOGY

After approval by the Advance Studies and Research Committee (ASRC) (No. F.1/IUIC-IIRS/ASRC-055/2020), a total of 30 participants with chronic back pain were recruited for the study. After a thorough selection process, 28 of them were included in this randomized control trial (RCT) with probability-based sampling methods to select participants for the study (simple random sampling) with pre-test-post-test design. The patients who were diagnosed by orthopedic surgeon and referred to physiotherapy clinic and those who met the inclusion criteria were included in the study. Patients were randomly divided into KT group and DN group.

Each participant underwent a pre-intervention evaluation before being randomly assigned to one of the groups, and outcome measurements were taken before the intervention, that is, baseline assessment. After the intervention of two weeks and the four weeks of treatment. After treatment, patients were assessed post-interventional. For KT participants, all the inspections were performed two weeks after KT removal. Kinesio tapes and dry needling were applied as additional treatment during the procedure. In KT group the two I-tapes were applied from the origin of the lumbar erector spinae (iliocostalis lumborum) to its insertion. The first 4-5 cm was applied to the sacrum. The affected person was requested maximum flexion of the backbone. The paper packing of the tape was removed, except for the last 4-5 cm; the tape was applied on one side paravertebrally under moderate traction. The last 4-5 cm of the tape was applied without traction.

In dry needling the needles were applied at a 90° to the multifidus, quadratus lumborum, and gluteus medius muscle groups, and at 45° for the erector spinae muscle. After the TP had been located, the skin was cleaned with alcohol, and needling performed. Over four weeks, the participants completed three sets of counselling exercises, consisting of 30-sec holds and a 30-sec three-fold break for each stage. A set of strength training (10 repetitions) was performed 3 times a week for more than 4 weeks. Active trigger points are common in the gluteus medius, quadratus lumborum, and deeper multifidus, which is one of the underlying stabilizing factors, but is also a significant source of pain. Patients with multifidus and erector spinae were placed face down while the gluteus medius and quadratus lumborum were tested in the lateral decubitus position. The multifidus, quadratus lumborum, and gluteus medius were positioned at a 90° angle, and the erector spinae were placed at a 45° angle.

Table 1: Demographic Data

Parameter	KT group	DN group	P-value
Age (y)	39.60 ± 13.69	37.15 ± 12.54	0.6
Mean height (cm)	1.64 ± 0.14	1.63 ± 0.15	0.8
Mean weight (kg)	67.60 ± 12.82	69.92 ± 11.05	0.6
Body mass index (kg/m^2)	27.15 ± 6.70	27.52 ± 5.13	0.8

Data presented as mean ± SD; P < 0.05 considered significant

Table 2: Roland-Morris Questionnaire Independent T-Test

Parameters	KT-Group	DN-Group	P-value
RMQ score at baseline	13.06 ± 3.78	12.76 ± 4.28	0.84
RMQ score at 2 weeks	8.53 ± 3.66	8.30 ± 3.83	0.87
RMQ score at 4 weeks	3.60 ± 2.16	3.84 ± 2.15	0.76

Data presented as mean ± SD; P < 0.05 considered significant

The needles were kept in place for 20 min. After 10 min, the needle was rotated to stimulate again. Six treatment sessions were performed twice a week. A physical therapist (SG) licensed in dry acupuncture at TP administered the procedure.[20]

2.1. Data analysis

SPSS Statistics version 20.0 was used to analyze the data, and significance was set at P < 0.05.

3. RESULTS

This study comprised 28 patients. The patients were assessed pre, mid and post-treatment through the Roland-Morris questionnaire and Numeric Pain Rating scale to observe improvement after intervention.

The demographic data was collected on a self-made questionnaire, which included the demographic data (Table 1).

4. DISCUSSION

The current study aimed to compare the effectiveness of Kinesio taping (KT) and dry needling (DN) in reducing pain and disability in patients using the Roland-Morris Disability Questionnaire (RMDQ) and Numeric Pain Rating Scale (NRS). Both interventions demonstrated significant pain relief and functional improvement at two and four weeks of treatment; with no statistically significant differences between the two groups. This suggests that both KT and DN are equally effective in managing musculoskeletal pain and disability over the short-term. Several studies have provided insights into the comparative effectiveness of KT and DN, aligning with or differing from the current findings. Akram A et al., reported equivalent pain relief with KT to DN, though DN showed slightly better outcomes after six weeks, suggesting a potential long-term benefit of DN. not observed within the four-week period of the current study.[21] Raza S et al. however, found no significant differences between KT and DN in terms of pain and disability reduction, supporting the findings of this study where both interventions were equally effective after four weeks.[22] In contrast, Mehmood M et al. found DN to be more effective in the long-term management of musculoskeletal pain, particularly in chronic cases, indicating that DN might have a sustained benefit beyond the short-term improvements noted here.[23] Lastly, a study conducted in 2018 found DN to outperform KT in reducing disability over an eight-week period, highlighting the importance of longer follow-up periods to capture the full therapeutic potential of DN.[24]

Table 3: Numeric Pain Rating Scale Independent T-Test

Parameters	KT-Group	DN-Group	P-value
NPRS score at baseline	7.29 ± 0.98	7.51 ± 1.09	0.57
NPRS score at 2 weeks	5.50 ± 1.59	4.98 ± 1.84	0.43
NPRS score at 4 weeks	2.55 ± 1.27	2.44 ± 1.35	0.82

Data presented as mean ± SD; P < 0.05 considered significant

Table 4: Chi-square test for categories of PNRS and disability for the groups

Group	Categories of PNRS average score	Categories of RMDQ Percentage improvement			Total	% within RMDQ Percentage improvement	P-value
		41-60 (moderately improved)	61-80 (significantly improved)	81-100 (highly improved)			
KT group (control group)	1-3 (mild pain)	0	1	1	2	13.3%	0.6
	4-6 (moderate pain)	3	7	3	13	86.7%	
	Total	**3**	**8**	**4**	**15**	**100%**	
Dry needling Group (experimental group)	1-3 (mild pain)	1	1	0	2	15.4%	
	4-6 (moderate pain)	3	6	2	11	84.6%	
	Total	**4**	**7**	**2**	**13**	**100%**	

Data presented as percentage (%); P < 0.05 considered significant

The comparable results between KT and DN in this study can be explained by the mechanisms of action of both interventions. KT works by improving proprioception, blood flow, and lymphatic drainage, thereby reducing pain and inflammation. DN, on the other hand, targets trigger points in muscles to release tension and promote healing. Both approaches may effectively reduce musculoskeletal pain through these distinct pathways, which could account for the similar outcomes. A study conducted in 2019 highlighted that both techniques address muscle tension and pain but through different neurophysiological processes, which could explain their equivalent short-term effects.[25] Additionally, Inglez et al. noted that both KT and DN provide immediate relief, which may have contributed to the improvements seen within the four-week timeframe of this study.[26]

This study's findings reinforce the strengths of both KT and DN as effective, non-invasive interventions for managing pain and disability. KT, as demonstrated

earlier, provides a non-invasive option that can be easily applied, making it accessible for patients in various settings.[27] DN, offers quick relief from deep-seated muscular tension, which may be especially beneficial for acute pain cases. Both interventions are relatively low-risk and cost-effective, making them suitable for broader clinical use.[28]

5. LIMITATIONS

Despite the strengths of this study, several limitations must be acknowledged. The sample size was relatively small, limiting the generalizability of the findings. Moreover, the study only followed patients for four weeks, which may not have been sufficient to observe the long-term effects of both interventions, particularly DN, which some studies suggest has a more pronounced effect over extended periods. The absence of a control group also prevents us from determining whether the improvements seen were exclusively due to the interventions or could be attributed to other factors such as natural recovery or placebo effects. Future studies should include larger sample sizes, longer follow-up periods, and control groups to provide a more comprehensive understanding of the comparative efficacy of KT and DN.

6. CONCLUSION

The current study proves that both dry needling and Kinesio taping can offer immediate relief from muscle tension and pain in patients with low back pain; but through different neurophysiological processes, which could explain their equivalent short-term effects.

7. Data availability

The numerical data generated during this research is available with the authors.

8. Acknowledgement

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9. Conflict of interest

The study utilized the hospital resources only, and no external or industry funding was involved.

10. Authors' contribution

All authors took equal part in the conduct of the study and in preparation of the manuscript.

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