



Effects Of Integrated Neuromuscular Inhibition Technique V/S Kinesio Taping On Trigger Points Of Quadratus Lumborum Muscle In Physiotherapy Students By Using Bubble Goniometer And Nprs

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Abstract

Background:

Low back pain (LBP) is highly prevalent among physiotherapy students due to prolonged faulty postures, repetitive clinical activities, and physical strain during training. Myofascial trigger points in the quadratus lumborum (QL) muscle are a common source of pain and restricted lumbar mobility. Integrated Neuromuscular Inhibition Technique (INIT) and Kinesio Taping (KT) are frequently used interventions for managing myofascial pain, but limited evidence exists comparing their immediate effects on QL trigger points in young physiotherapy students.

Aim: To compare the effects of Integrated Neuromuscular Inhibition Technique and Kinesio Taping on pain and lumbar range of motion (ROM) in physiotherapy students with trigger points in the quadratus lumborum muscle.

Methodology:

An experimental study was conducted on 30 physiotherapy students aged 18–25 years with moderate low back pain (NPRS 4–7). Participants were randomly divided into two groups: Group A received INIT along with conventional exercises, and Group B received Kinesio Taping along with the same conventional exercises. Interventions were given for 5 sessions. Pain intensity was measured using the Numerical Pain Rating Scale (NPRS), and lumbar ROM (flexion, extension, right and left side bending) was assessed using a bubble goniometer. Pre-treatment, immediate post-treatment, and post-intervention readings were recorded.

Results:

Both groups showed statistically significant reductions in pain and improvements in lumbar ROM after the intervention ($p < 0.05$). INIT demonstrated significant improvements in lumbar flexion, extension, and side bending along with pain reduction. Similarly, the Kinesio Taping group showed significant pain reduction and ROM improvement across all measured lumbar movements. On comparison, both interventions were found to be effective, with no clear superiority of one technique over the other.

Conclusion: Integrated Neuromuscular Inhibition Technique and Kinesio Taping, when combined with conventional exercises, are both effective in reducing pain and improving lumbar range of motion in physiotherapy students with quadratus lumborum trigger points. Both techniques can be considered useful short-term treatment options in clinical practice.

Keywords: Low back pain, Quadratus lumborum, Trigger points, Integrated Neuromuscular Inhibition Technique, Kinesio Taping, Physiotherapy students, Lumbar range of motion.

Introduction

The prevalence of low back pain (LBP) has been reported among different populations with particular interest in various occupational groups. Consequently, several studies have focused on the prevalence of LBP among various health care professionals including physiotherapists ^[1].

Physiotherapists are professionals provide rehabilitative care in a wide range of disabling conditions with the aim of restoring, maintaining, and promoting function. Interventions utilized by physiotherapists often entail a considerable amount of “hands-on” techniques that are characterized by repetitive movements, prolonged standing, and somewhat difficult postures. Transferring and lifting patients are also common work activities in physiotherapy and such activities are considered risk factors for LBP and have been linked to its onset ^[1].

It is important to note that exposure to many of these physiotherapy work activities commences from the period of undergraduate physiotherapy training thus making LBP a likely occurrence among physiotherapy students. The potentially deleterious postures physiotherapy students assume during other training-related activities such as prolonged sitting during lectures or personal study and practical classes involving practice of tests and therapeutic techniques may also increase the risk of LBP. With the potentially high risk of LBP among physiotherapy students, several studies have explored the subject matter in different parts of the world ^[1].

Trigger points most commonly found in the muscles of low back. Trigger points form the major part of pain suffered by people with musculoskeletal dysfunction. Low back pain is a condition in which most commonly there are trigger points in quadratus lumborum ^[2].

The quadratus lumborum is deeper than the erector spinae and multifidus muscles. The quadratus lumborum, when acting bilaterally, serves as an important frontal plane stabilizer and is active in many tasks. When acting unilaterally the quadratus lumborum can laterally flex the spine. The quadratus lumborum can also control rotational motion due to its attachments to the transverse processes of lumbar vertebrae ^[3].

The presence of trigger points could be due to repetitive loading of the muscle tissue. Active trigger points are those that cause pain at rest or with activity of the muscle containing the trigger point. Latent trigger points do not cause pain but may cause restricted movement and weakness of the muscle containing the trigger points. Trigger points can be treated effectively with various manual therapy techniques such as ischemic compression (IC), positional release techniques/strain counterstrain (SCS) technique, myofascial release ^[2]



Fig -1

Trigger point of low back muscles

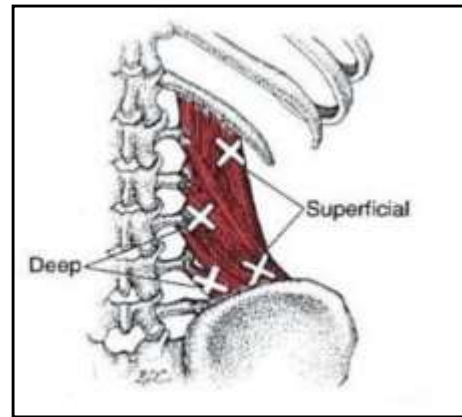


Fig -2

Trigger points of Quadratus lumborum

Although clinical trials have been conducted to study the efficacy of individual techniques that include MET, IC, and SCS techniques in neck and myofascial pain syndrome, it was hypothesized that a combination of the three techniques may be more effective in treating the trigger points as suggested by Leon Chaitow. This method is termed as an integrated neuromuscular inhibition technique (INIT). Chaitow and Crenshaw state that the combination of IC, MET, and SCS produces the most effective, targeted approach to trigger point release. They suggested that the benefit of this technique lies in its multifaceted approach. It allows for delivery of the techniques in a single coordinated manner.

1. **Muscle Relaxation:** INIT techniques often involve applying sustained pressure or stretching to muscles, which can lead to a reduction in muscle tension and promote relaxation (Bialosky et al., 2009).
2. **Improved Circulation:** INIT techniques may enhance blood flow to the treated area, promoting tissue oxygenation and nutrient delivery while facilitating the removal of metabolic waste products (Hou et al., 2010).
3. **Decreased Pain Perception:** INIT can modulate pain perception through various mechanisms, including the activation of mechanoreceptors and the release of endogenous pain-relieving substances (Fernández-de-Las-Peñas et al., 2010).

Recent years, the use of a therapeutic tool called kinesiology tape (KT) has increasingly become popular to use for musculoskeletal disorders. K-Tape is made up of Colourful elastic cotton strips with In an acrylic adhesive that may be stretched to up to 140% of their original length. KT is assumed to have several benefits, including (1) pain reduction through neurological suppression, (2) reposition of subluxated joints by decreasing abnormal muscle tone, (3) to create more space by lifting fascia and soft tissue to improve circulation, (4) correcting muscle function by strengthening weak muscles^[5].

Physiological effects such as:

1. Structural support: Kinesio taping can help with the structural support muscles and joints helping to reduce pain. (Kase et.al)
2. It may improve blood circulation and lymphatic circulation by helping to remove metabolic waste there by reducing inflammation. (Stone et.al)
3. Kinesiology tape may reduce pressure on pain receptors.



Fig-3

Star shape k-taping for lower back

METHODOLOGY

Study type- Experimental

Sample technique- Purposive sampling

Sample size- 30

Study area- Physiotherapy college, PCMC.

INCLUSION CRITERIA	EXCLUSION CRITERIA
Physiotherapy students with back pain of moderate intensity (4-7) on Numerical pain rating scale examination.	Recent fall
Age between 18-25 years.	Recent injuries
	Surgery
	Any known spinal conditions

OUTCOME MEASURE: -**1. Numerical Pain Rating Scale (NPRS):**

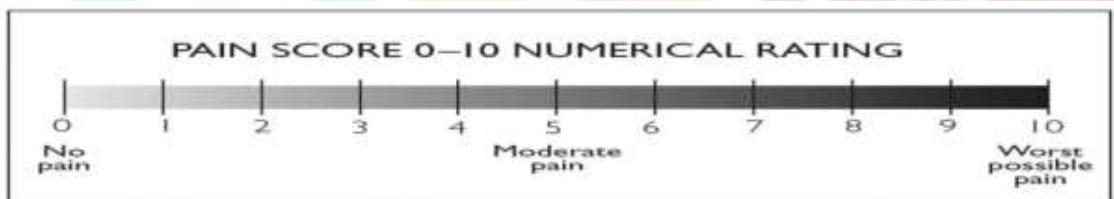
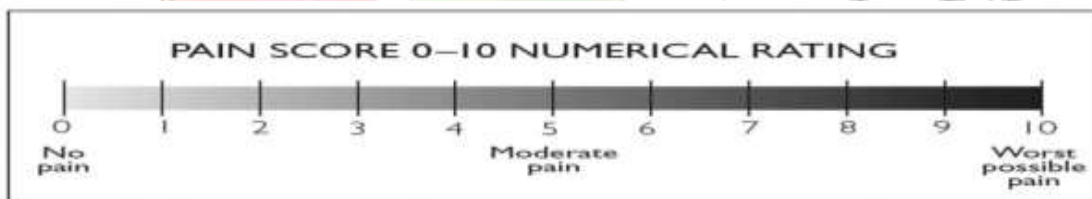
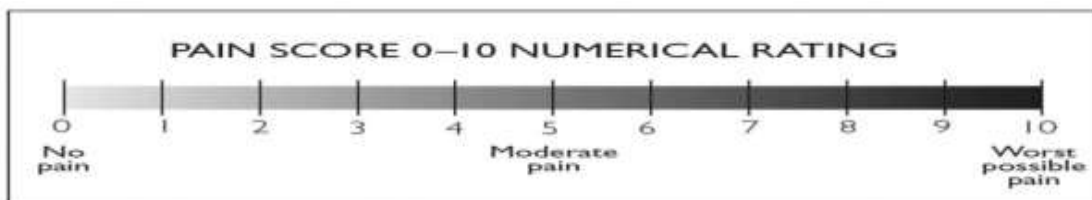
Used to assess pain intensity on a scale of 0–10.

2. Lumbar Range of Motion (ROM) using Bubble Goniometer:

Measured lumbar flexion, extension, right side bending, and left side bending in degrees.

Measurements were taken before treatment, immediately after treatment, and after completion of all sessions.

OUTCOME MEASURES	PRE	POST-IMMEDIATE	POST TREATMENT SESSIONS	ALL
NPRS				
Bubble goniometer				

PAIN INTENSITY- NPRS**PRE:****POST IMMEDIATE:****POST ALL SESSIONS:**

PROCEDURE:

Permission was taken from the ethical committee about the research to be conducted

Consent was taken from the subjects for research

Subjects randomly allocated in two groups by using chit method

(Group A) INIT +conventional therapy (Group B) K-Taping +conventional therapy

Pre-assessment

Treatment(5sessions)

Post Assessment

Statistical Analysis

INIT PROCEDURE:

- Position the patient in prone position. The site of trigger point identified by asking the subjects about the area of pain then by pincer palpation the investigator determines the trigger points.
- Once the trigger points identified intermittent ischemic compression started by the pincer grip of trigger point by using thumb and index
- The pressure applied for five seconds on and five seconds off then continuously for 90 seconds depending on the tolerability of subjects then repeated three times per session.
- Strain counter strain, this technique, the therapist positions the affected muscle or joint in a position of comfort, reducing tension and promoting relaxation. It aims to reset the muscle's proprioceptors and alleviate pain.
- Hold the position for 90sec to 2min



Fig no.4 Integrated Neuromuscular Inhibition Technique

KINESIO – TAPING PROCEDURE:

Positioning - Have the patient lie on their side with the affected side facing up. Identify the QL muscle, which runs from the iliac crest (top of the hip bone) to the lower ribs. The star-shaped taping will cover the QL muscle and surrounding area.

Application - Cut three shorter I-strips of equal length from the kinesiology tape. Apply the first strip vertically along the QL muscle, starting from the iliac crest and extending upward toward the lower ribs. Apply with 25-50% tension.

Apply the second strip horizontally across the QL muscle, crossing the first strip. Again, apply with 25-50% tension.

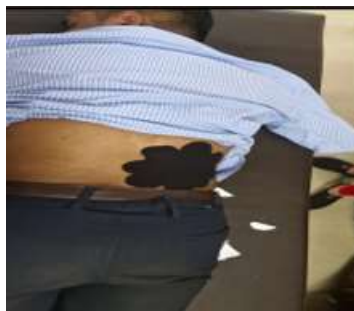


Fig No 5. Kinesio Taping Star Taping.

- Finally, apply the third strip diagonally from the lower ribs toward the iliac crest, creating a star pattern over the QL muscle.
- Ensure that the tape adheres well to the skin without wrinkles or folds.

CONVENTIONAL THERAPY

- Isometric back exercise, knee to chest, pelvic bridging, back extension cat camel.
- Each exercise was performed in 3sets of 10 repetitions by the subjects of both the groups.
- Conventional therapy will be given to both the groups for 5days/week.



Fig No. 6 - Conventional Therapy.

BUBBLE INCLINOMETER

1. Lumbar Flexion and Extension:

Position: Have the subject stand upright or sit on a stable surface.

Placement: Place the inclinometer near the lumbar spine (usually over the lower back) and set it to zero.

Action: Ask the subject to flex forward (lumbar flexion) or extend backward (lumbar extension).

2. Lateral Bending (Right and Left):

Position: The subject stands upright.

Placement: Position the inclinometer over the lumbar spine, aligned with the lateral aspect. Action: Ask the subject to bend sideways to the right (right lateral flexion) or left (left lateral flexion)



Fig no.7 lumbar flexion ROM.

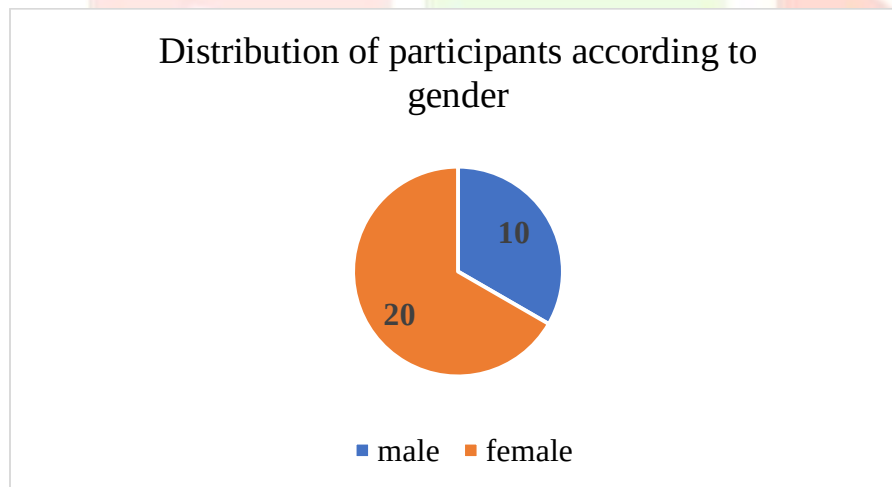
STATISTICAL ANALYSIS

Data collection

Table 1- Demographic data

Demographic data	Subjects
Male	10
Female	20

Graph No 1 – Demographic data

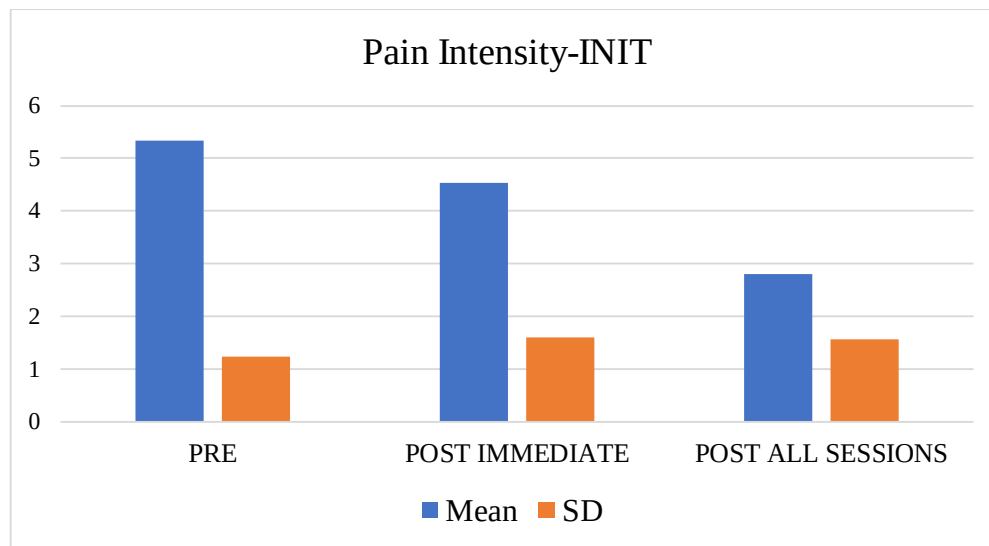


Interpretation: There are 33.33 % of males and 66.66 % of females

Table 2 – Pre, post immediate and post all sessions Pain intensity in Quadratus lumborum muscle.

Pain intensity	Pre-INIT	Post immediate-INIT	Post all sessions-INIT	P value
MEAN	5.33	4.53	2.8	0.0001006
SD	1.23	1.59	1.56	

Graph 2: Pre, post immediate and post all sessions Pain intensity in Quadratus lumborum muscle.

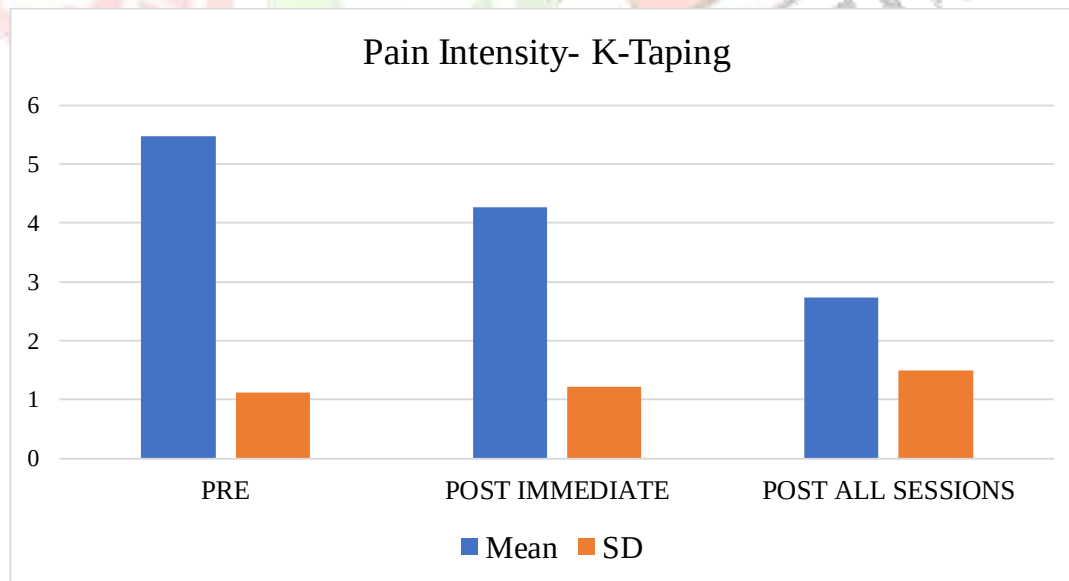


Interpretation: There is significant difference between the mean of pre, post immediate intensity and post all session pain intensity

Table 3 – Pre, post immediate and post all sessions Pain intensity in Quadratus lumborum muscle.

Pain intensity	Pre-K-Tape	Post immediate-K-Tape	Post sessions-all K-Tape	P value
MEAN	5.5	4.3	2.7	0.000003921
SD	1.1	1.2	1.5	

Graph 3: Pre, post immediate and post all sessions Pain intensity in Quadratus lumborum muscle.

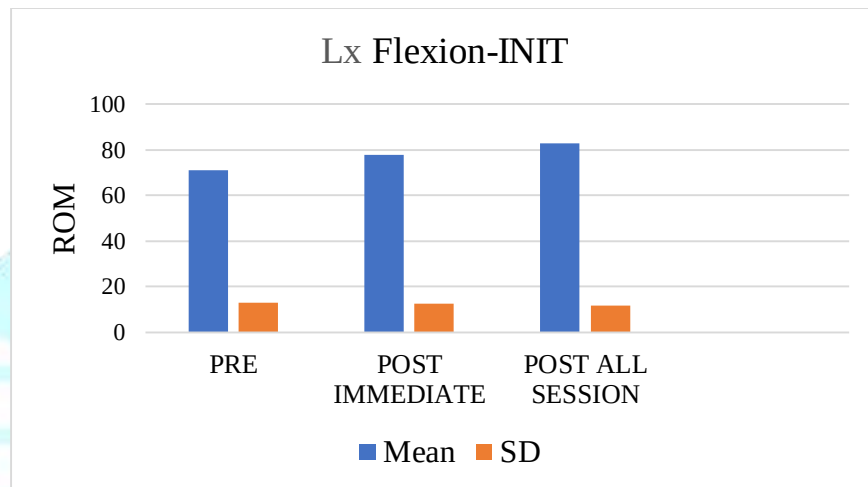


Interpretation: There is significant difference between the mean of pre, post immediate intensity and post all session pain intensity.

Table 4- Pre, post immediate and post all session Lumbar flexion in Quadratus lumborum muscle.

	Pre-Lx-flexion	Post immediate Lx-flexion	Post all sessions Lx-flexion	P value
MEAN	71.2	78	82.9	0.0443
SD	13.1	12.5	11.7	

Graph 4 -Pre, post immediate and post all sessions Lumbar flexion in Quadratus lumborum muscle.

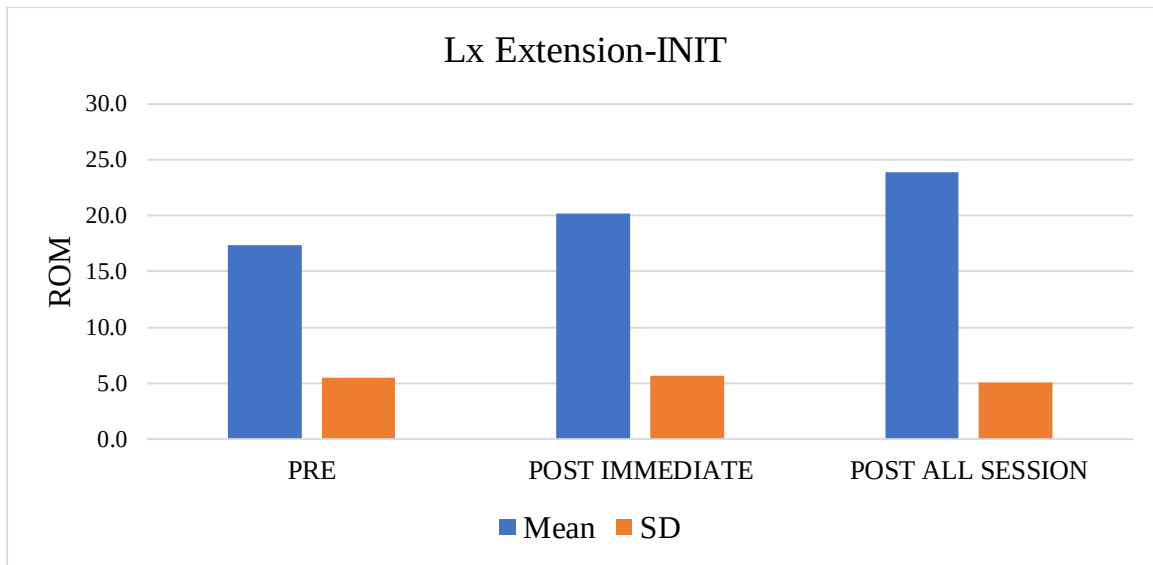


Interpretation: There is significant difference between the mean of pre-treatment Lx flexion and post treatment Lx flexion

Table 5- Pre, post immediate and post all session Lumbar extension in Quadratus lumborum muscle

	Pre-Lx extension	Post immediate Lx extension	Post all sessions Lx extension	P value
MEAN	17.3	20.1	23.9	0.0077
SD	5.5	5.7	5.0	

Graph 5- Pre, post immediate and post all sessions Lumbar extension in Quadratus lumborum muscle.

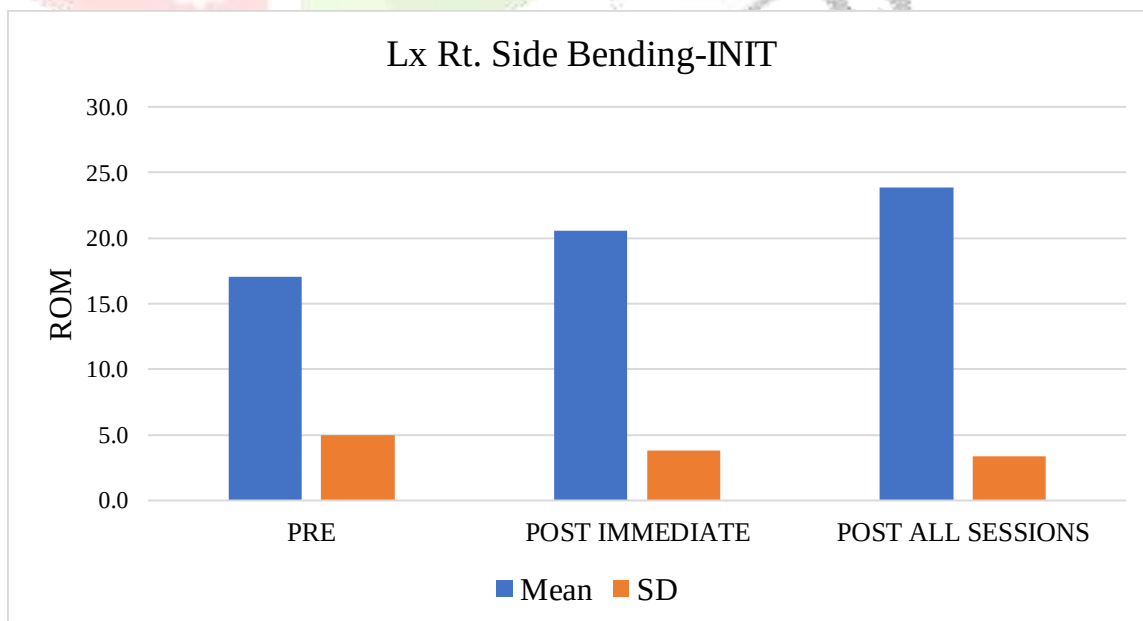


Interpretation: There is significant difference between the mean of pre-treatment Lx extension and post treatment Lx extension.

Table 6- Pre, post immediate and post lumbar rt side bending in Quadratus lumborum muscle.

	Pre-Rt. side bending	Post immediate-Rt. side bending	Post all sessions-Rt' side bending	Pvalue
Mean	17.1	20.5	23.9	0.0002
SD	4.9	3.8	3.3	

Graph 6: Pre, post immediate and post all sessions lumbar Rt side bending in Quadratus lumborum muscle.

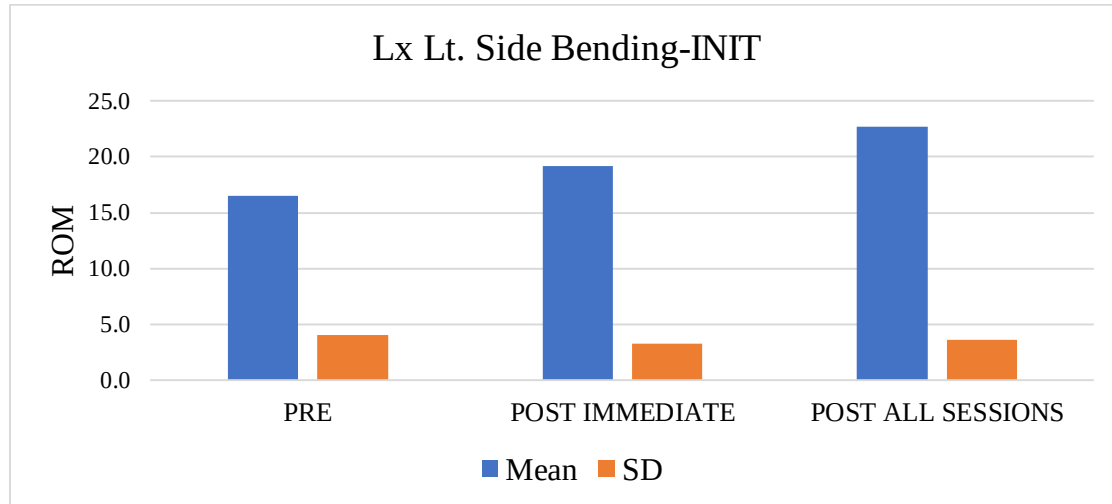


Interpretation: There is significant difference between the mean of pre-treatment Lx Rt. side bending and post treatment Lx Rt. side bending.

Table 7- Pre, post immediate and post all sessions Lumbar Lt side bending in Quadratus lumborum muscle.

	Pre-Lt side bending	Post immediate-Lt side bending	Post all sessions-Lt side bending	Pvalue
Mean	16.5	19.2	22.7	0.0002
SD	4.1	3.3	3.68	

Graph 7- Pre, post immediate and post all sessions lumbar Lt side bending in Quadratus lumborum muscle.

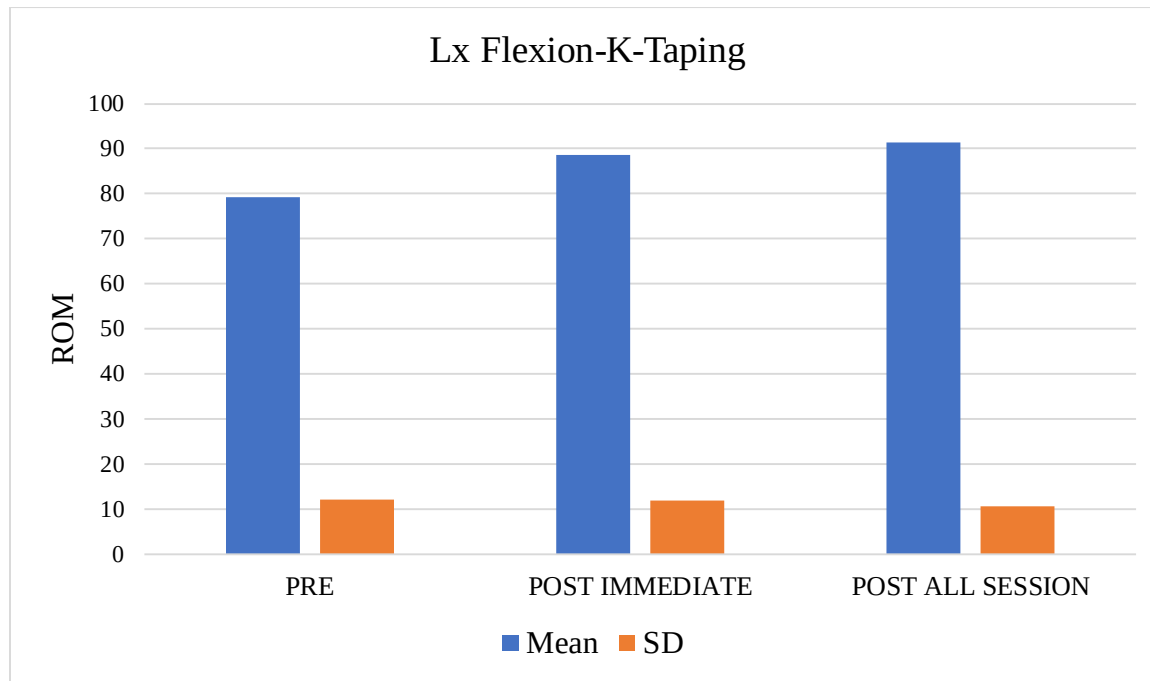


Interpretation: There is significant difference between the mean of pre-treatment Lx Lt side bending and post treatment Lx Lt side bending.

Table 8- Pre, post immediate and post all sessions Lumbar flexion in Quadratus lumborum muscle.

	Pre-Lx flexion	Post immediate-Lx flexion	Post all sessions-Lx flexion	Pvalue
Mean	79.2	88.7	91.5	0.0157
SD	12.2	11.8	10.7	

Graph 8: Pre, post immediate and post all session Lumbar flexion in Quadratus lumborum muscle.

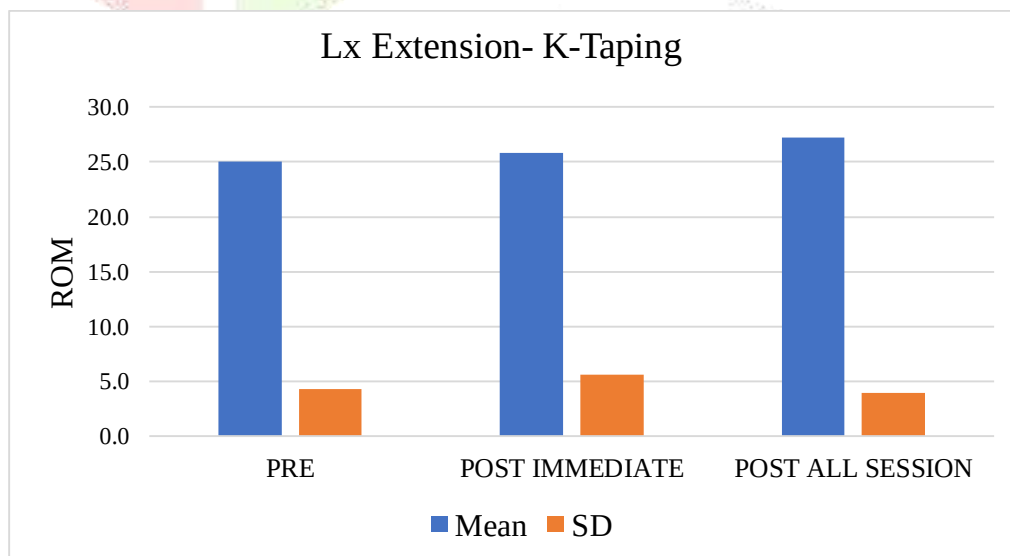


Interpretation: There is significant difference between the mean of pre-treatment Lx flexion and post treatment Lx flexion.

Table 9- Pre, post immediate and post all session lumbar extension in Quadratus lumborum muscle.

	Pre-Lx extension	Post immediate-Lx extension	Post all sessions-Lx extension	Pvalue
Mean	25.1	25.9	27.2	0.04554
SD	4.3	5.6	4.0	

Graph 9: Pre, post immediate and post all session Lumbar extension in Quadratus lumborum muscle.

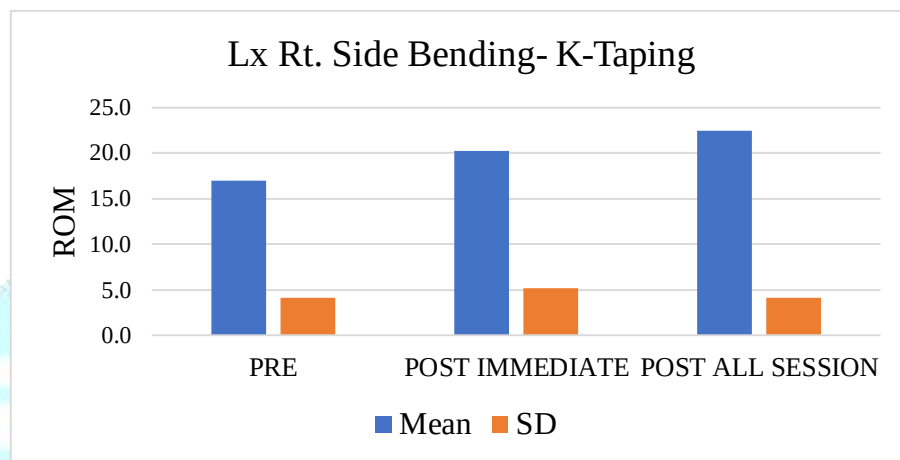


Interpretation: There is no significant difference between the mean of pre-treatment Lx extension and post treatment Lx extension

Table 10- Pre, post immediate and post all session lumbar rt side bending in Quadratus lumborum muscle.

	Pre-Rt side bending	Post immediate-Rt side bending	Post all sessions-Rt side bending	Pvalue
Mean	16.9	20.3	22.4	0.0073
SD	4.1	5.2	4.2	

Graph 10: Pre, post immediate and post all session lumbar Rt side bending in Quadratus lumborum muscle.

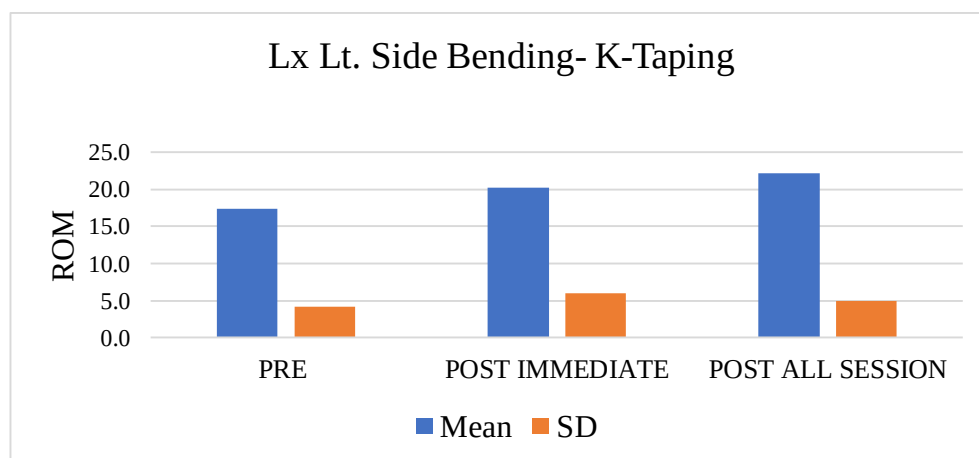


Interpretation: There is significant difference between the mean of pre-treatment Lx Rt. side bending and post treatment Lx Rt. side bending.

Table 11: Pre, post immediate and post all session lumbar Lt side bending in Quadratus lumborum muscle.

	Pre-Lt side bending	Post immediate-Lt side bending	Post all sessions-Lt side bending	Pvalue
Mean	17.3	20.3	22.1	0.045
SD	4.2	6.0	5.0	

Graph 11: Pre, post immediate and post all session lumbar Lt. side bending in Quadratus lumborum muscle.



Interpretation: There is significant difference between the mean of pre-treatment Lx Lt. side bending and post treatment Lx Lt. side bending.

DISCUSSION

This study investigated the effectiveness of two interventions, Integrated Neuromuscular Inhibition Technique (INIT) and Kinesio Taping, in reducing pain and improving range of motion (ROM) among physiotherapy students. Thirty students were randomly assigned to one of two groups: Group A, receiving INIT, or Group B, receiving Kinesio Taping. Both groups received conventional therapy in addition to their assigned intervention. The study protocol spanned five days. Group A participants received INIT on alternating days, followed by conventional therapy each day. Group B participants received Kinesio Taping on the first and fifth days, with conventional therapy administered daily. The study aimed to determine which intervention, INIT or Kinesio Taping, was more efficient in achieving pain reduction and ROM improvement in this population.

In group A (Integrated Neuromuscular Inhibition Technique) had mild to moderate pain level and approximately 20% reduction of pain over 5 sessions. There are several studies which investigated the effect of INIT over pain and ROM in individual with low back pain. In the study by Santosh C Metgud 2020^[5] they concluded that INIT decrease pain scores after 5days of application. This can be explained by the effect of IC technique, the pressure applied on the taut band on the muscle fiber increases the length of the sarcomere on the affected trigger points and by the stimulation of A-beta fibers that affects the pain gate during pressure and increases circulation when the pressure is released. This allows a drainage of the cellular metabolic byproducts commonly associated with the pain production in the MTrP. Thus, this technique restores a normal metabolic functioning of the tissue which is affected Secondly, Strain-Counterstrain allows improvement of function and ROM. This technique acts on the muscle spindle mechanism which are receptor organs responsible for maintaining the tone in the muscle; therefore, once the muscle spindles are realigned, there is an increase in the length of the muscle, which is the explanation to the decrease in pain and increase in ROM in the current study. Amit V Nagrale 2010^[14] says that INIT used in trigger points helps in reducing pain and improves ROM by decreasing the sensitivity of the pain nodules in muscles and the local pressure may equalize the length of sarcomeres in the involved trigger points and consequently decreasing pain.

In our study similar findings were obtained in which the pain of the subject reduced by statistically significant values. As INIT helps deactivate painful trigger points, loosen tighten muscle, restore proper muscle function. It reduces pain by applying direct pressure can be attributed to improvement of local blood flow following release of compression and spinal reflex mechanism. A nociceptive response is produced following pressure that can result in tension and stress reduction in affected muscle and resetting muscle spindle and potentially reducing pain and improving ROM.

In group B (Kinesio-taping) had mild to moderate pain level and approximately 25% reduction of pain over 5 sessions. There are several studies which investigated the effect of k-taping over pain and disability in individual with low back pain. However, there is no study done in students which tells the effectiveness of k-taping on pain. In the study by abassi et al 2020^[6] they concluded that k-taping decrease pain scores after 5days of application. Pain reduction after applying KT with tension may be due to lifting the skin and enhancing subcutaneous space and, as a result, reduced activation of pain receptors, also possibly activates descending inhibitory system. Also, in the gate control theory of pain, tactile stimulation of KT would reduce the afferent signal of large-diameter non-nociceptive fibers resulting in a reduction of pain, improvements of postural control, range of motion, circulation, and proprioception. Liane B Macedo et al 2018^[8] says that kinesio tape reduces pain by gate control theory of pain which suggest that mechanical stimulus provided by the tape would act through the large diameter non- nociceptive fibres resulting in pain inhibition.

In our study similar findings were obtained in which the pain of the subject reduced by statistically significant values. The kinesio taping are to increase ROM, decrease discomfort by increasing the area under the skin and soft tissue and speed up healing process b enhancing circulation.

Suresh B Reddy 2015^[15] in this study of Conventional therapy exercises, the concentration is on strengthening the isolated muscles where conventional back care exercise and core stabilization exercise are proved to be effective in low back pain as the muscle co-activate to stabilize the spine and whole body.

Conventional back pain exercises and core stabilization protocols helps in providing stability and support for the spine, and reducing strain on painful structures. Hence improving flexibility and mobility of the spinal musculature. Exercise increase circulation to muscles of the back, bringing in nutrition, washing off the inflammatory substance that promotes healing and return to functional state.

Based on the obtained results, both the techniques integrated neuromuscular inhibition technique and kinesio taping in assistance to the conventional back exercises, helps in decreasing pain and increasing ROM on patients with trigger points of lower back muscles.

Conclusion

This study concludes that both k taping and INIT helps in decreasing pain and increasing ROM but neither of them is better than the other.

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