Advanced International Journal for Research (AIJFR)
E-ISSN: 3048-7641 ● Website: www.aijfr.com ● Email: editor@aijfr.com

Effect of Mckenzi Extension Exercises Along with PA Central Mobilization in Subjects of Acute Low Back Pain

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Abstract

Background- Acute low back pain is one of the common conditions affecting daily functioning and quality of life of the patient. The aim of this study was to investigate whether McKenzie extension exercises in conjunction with PA central mobilization compared with interferential therapy and isometric exercises was more effective in treating acute low back pain.

Objective: To compare the results of pain and disability in patients with acute LBP undergoing McKenzie exercises and PA mobilization against control interventions.

Methods: Two groups were used: the experimental intervention in Group A consisted of McKenzie extension exercises and PA central mobilization, while Group B consisted of interferential therapy, hot packs, and spine isometric exercises. The outcomes were measured by using the Numeric Pain Rating Scale and the Oswestry Low Back Disability Index in both the beginning and after treatment.

Results - Group A had a statistical reduction in mean NPRS score from 7.46 ± 1.54 pre-test to 2.0 ± 1.41 post-test ($t = 9.92$, $p < 0.0001$). OLBDI scores were shown to have decreased from 78.0 ± 12.19 pretest to 28.73 ± 9.70 post-test scores ($t = 12.69$, $p < 0.001$). Group B also improved dramatically, but the NPRS shifted from 8.06 ± 1.33 to 4.33 ± 0.59 ($t = 16.36$, $p < 0.0001$), and OLBDI from 77.4 ± 8.10 to 49.4 ± 6.09 ($t = 10.73$, $p < 0.0001$). Improvement was greater, however, for Group A for both outcomes.

Conclusion: The results of this study suggest that combining McKenzie extension exercises with PA central mobilization is significantly more effective than traditional treatment modalities in reducing pain and disability in patients with acute LBP. Such findings point out the importance of using targeted therapeutic approaches in clinical practice to optimize recovery in individuals suffering from acute low back pain. Further research is warranted to explore long-term effects and patient-specific factors influencing treatment outcomes.

Keywords: Low Back Pain; McKenzie Method; Exercise Therapy; Spinal Mobilization; Interferential Current Therapy; Isometric Contraction; Pain Measurement; Disability Evaluation

1. Introduction

Acute low back pain is a very common clinical condition. It is described as a sudden onset of soreness or aching in the lumbar region, commonly referred to as the lower back. It usually lasts less than six weeks and can be mild or even severely painful. The causes of ALBP are different and may comprise muscle or ligament strains, disc herniation, joint dysfunction, skeletal abnormalities, and in extreme cases, infection or inflammatory condition. Muscle or ligament strain accounts for the commonest cause due to overuse, poor techniques, or sharp movements while involved in some activities. Herniated discs, where the soft material inside the disc leaks out and puts pressure on nearby nerves, commonly cause not only lower back pain but also radiating leg pain, known as sciatica. Joint dysfunction, stemming from irritation or misalignment of the small facet joints in the spine, contributes significantly to discomfort. Skeletal irregularities like scoliosis or kyphosis create uneven spinal curvature, leading to added stress on the lower back. Rarely, infections or inflammatory conditions like osteomyelitis or ankylosing spondylitis may manifest as acute low back pain, which is often associated with systemic symptoms such as fever and stiffness.

Localized or radiating pain, stiffness, and restricted mobility are symptoms of ALBP. Pain can range from sharp stabbing sensations to dull aching discomfort and usually worsens with activities like bending, lifting, or prolonged sitting and standing. Further complications may include stiffness and rigid movements that limit the ability to freely bend or twist. Physical examination, with further assessment of the symptoms, range of motion, and neurological status, completes the proper diagnosis. Imaging tests such as X-rays, MRI, or CT are applied when fractures or infections are suspected.

Treatment for ALBP includes rest, pain management, physical therapy, and patient education. Although complete bed rest is not often recommended, activity modification and light, non-strenuous exercises are used to maintain mobility without exacerbating the condition. Pain relief is often achieved through NSAIDs such as ibuprofen or naproxen, with stronger medications reserved for persistent symptoms. Physical therapy plays a central role in rehabilitation, focusing on exercises that strengthen spinal-supporting muscles, improve flexibility, and restore function. Additional interventions like heat and cold therapy are used to reduce inflammation and promote healing. Patient education emphasizes proper body mechanics, ergonomic adjustments, and preventive measures such as posture correction and regular exercise to reduce the likelihood of recurrence.

This manual therapy intervention commonly used for treatment of lumbar spine dysfunction utilizes the Posterior-Anterior (PA) Central Mobilization technique. Through controlled pressure over targeted spinal segments, this technique allows for the elimination of pain and enhancement of range of motion towards the restoration of functional performance. The mobilization technique of PA central mobilization is specifically helpful in cases of acute or chronic low back pain, restricted range of motion secondary to disc herniation or joint dysfunction, and lumbar sprains or strains. It is carried out by positioning the patient prone on a table with a pillow placed under the abdomen to support and provide access to facilitate the therapist in applying rhythmic, anteriorly directed pressure on the spinous processes of the lumbar

vertebrae. Throughout the procedure, the therapist monitors the patient's response to ensure that the mobilization is effective and well-tolerated. Contraindications for PA central mobilization include severe osteoporosis, acute inflammatory conditions, recent spinal surgery, neurological deficits like cauda equina syndrome, and severe disc herniation with nerve involvement.

This technique should only be performed by a trained and experienced therapist to prevent potential harm. Combining PA mobilization with exercises and patient education enhances outcomes by addressing both the immediate symptoms and underlying causes of low back pain. Properly implemented, this approach reduces pain, improves mobility, and empowers patients to maintain an improved quality of life.

McKenzie Extension Exercises

McKenzie extension exercises are an element of the well-known McKenzie Method, or Mechanical Diagnosis and Therapy (MDT), designed by Robin McKenzie, a physiotherapist from New Zealand. These exercises center on evaluating and treating spinal pain, mainly within the lumbar region. McKenzie extension exercises are designed for patients with low back pain, disc herniation, or sciatica to centralize pain, meaning move it away from the limbs and toward the spine, and to promote healing by restoring proper spinal alignment and function.

Purpose and Benefits of McKenzie Extension Exercises

One of the primary purposes of McKenzie extension exercises is to centralize pain. This means that the pain is transferred from the extremities, such as the legs or buttocks, to the lower back. Centralized pain is generally easier to treat and indicates that the underlying issue is responding well to therapy. Another advantage of these exercises is the reduction of nerve compression. Many spinal conditions, such as herniated discs, result in nerve impingement, leading to radiating pain, tingling, or numbness in the legs (sciatica). The extension exercises will work to take pressure off the discs and nerves causing this problem, thereby reducing symptoms.

In addition, repeated practice of these exercises helps to restore spinal range of motion and strengthen the surrounding musculature, which provides better support to the spine and reduces the likelihood of recurrence. McKenzie exercises also place much emphasis on the need to maintain proper posture and spinal alignment, which are often lost in people with back pain. By reinforcing good postural habits, these exercises can prevent future episodes of pain.

Indications for McKenzie Extension Exercises

McKenzie extension exercises are particularly effective in cases such as disc herniation or bulging discs because they reduce the protrusion of the disc and consequent nerve irritation. The patient suffering from sciatica appreciates these exercises since they relieve the patient of radiating pains in the leg due to compression of the nerve root. McKenzie exercises have also proved useful in treating postural syndrome, which arises due to prolonged periods of poor posture. They are also a common treatment for mechanical low back pain, that is caused by inappropriate movement patterns or mechanical stress on the spine.

But these exercises can't be taken for people suffering from non-mechanical back pain, and people with very severe spinal instability, or even in acute inflammatory conditions without taking any prior advice from a medical doctor.

McKenzie Extension Exercise Steps and Progression

The first stage in McKenzie extension exercises is prone lying, which involves the patient lying flat on his or her stomach with arms relaxed by the side. This will help patients who have acute pain to adapt passively to lumbar extension. The next stage is prone on elbows, where the patient supports the upper body on the elbows. This introduces a mild extension to the lumbar spine, which encourages the disc to move back toward its normal position.

The following progression is prone press-ups, where the patient places their hands under their shoulders and gently presses the upper body upward whilst leaving the pelvis on the floor. The patient achieves a better lumbar extension, thereby reducing nerve compression further. The final stage in this progression is standing lumbar extensions, where the patient stands, places their hands on their lower back for support, and leans backward as far as comfortable. This exercise is convenient for daily use and helps maintain the benefits of the prone exercises.

1. **Prone Lying:**

Lie flat on a surface or mat with your face facing downwards.

Lay your arms at your sides and relax

Hold this for 5-10 minutes, which helps alleviate pressure on the spine.

2. **Prone Prop on Elbows**

Lie face down and push your upper body forward onto your elbows while keeping your hips on the ground.

Maintain this for 5-10 minutes with the gentle feeling of extension in your lower back.

3. **Press-Ups**

Lie face down, place your hands under your shoulders.

Push through your hands to lift your upper body off the ground while keeping your hips and legs in contact with the mat.

Hold for a few seconds, then lower back down. Repeat several times.

4. **Standing Back Extensions:**

Stand tall with your feet shoulder-width apart.

Place your hands on your hips and gently arch your back by pushing your chest forward and leaning back slightly.

Hold for a few seconds and return to standing. Repeat several times.

Extension in Standing:

Stand with your feet shoulder-width apart, hands on your lower back.

Lean backward gently while pressing your hips forward.

Hold for a few seconds and return to the neutral position.

For some patients, progressive overpressure may be added to further enhance the therapeutic effect. This involves applying extra pressure during the exercises, typically under professional supervision.

McKenzie extension exercises should be done in the presence of a trained physical therapist initially, to ensure proper technique and avoid worsening symptoms. Monitor patient feedback during the exercises. Pain should centralize or decrease during the exercises. If pain worsens or moves farther down the limb, the exercises should be stopped, and professional advice sought.

Consistency is also important. Patients are usually recommended to do the exercises several times a day for optimal results. The exercise protocol should be tailored to the patient's specific condition and tolerance since not all patients will follow the same progression.

McKenzie extension exercises are a cornerstone in the treatment of mechanical low back pain and related conditions. These exercises repair the mechanical dysfunction itself, relieving the pain and consequently the cause of pain. With proper guidance and consistent application, the patient can achieve appropriate repair of impaired mobility, function, and quality of life. In order to realize the maximum therapeutic potential, appropriate execution and professional supervision are required, especially in the initial stages.

METHODOLOGY

Study Participants

The study comprised 30 patients who were both male and female and aged between 20 and 40 years who presented with acute low back pain lasting for more than a week. The patients reported symptoms of pain, stiffness, and a reduced range of motion associated with low back pain. Each participant was diagnosed by a physiotherapist who carefully excluded any individuals with other muscular or skeletal pathologies of the lumbar spine or hip.

Study Design and Methodology

Participants were selected following informed consent, and random simple allocation into the two groups occurred. To maintain unbiased outcomes, the process of randomization was blinded and, to further exclude any confounding through discussions on their treatments, they were not allowed to converse regarding their treatment approaches.

The research took place for two months. There were no dropouts after the end. Baseline measurement was taken at the start, and VAS and OLBDI were used.

The treatment program was carried out for two weeks, and each session was thrice a week on alternate days. There were two groups made:

Group A: Experimental Group

It had 15 patients

They received Interferential Therapy (IFT) for 15 minutes.

Hot pack was given immediately after it for 15 minutes.

Posterior-Anterior (PA) Central Glide mobilization

McKenzie extension exercises

Group B: Control Group

This group also included 15 patients.

Got the same treatment protocol to Group A

Participants were IFT for 15 minutes in addition to Hot pack therapy which was also taken for 15 minutes.

On the contrary instead of mobilizing, spine isometric exercises were administered.

Outcome Measure

On final day of trial, VAS and OLBDI assessment was undertaken to measure extent to which participants exhibited low back pain. This measuring tool was reflective of the adequacy of those treatments.

RESULTS

Table 1.0

AGE DISTRIBUTION IN SUBJECTS					
S.No	Age in years	GROUP A		GROUP B	
		No	%	No	%
1	25-30	5	33.3	4	26.6
2	31-35	5	33.3	6	40
3	36-40	2	13.3	3	20
4	41-45	3	20	2	13.3
TOTAL		15	100%	15	100%
MEAN		3.75		3.75	
SD		1.299038106		1.479019946	

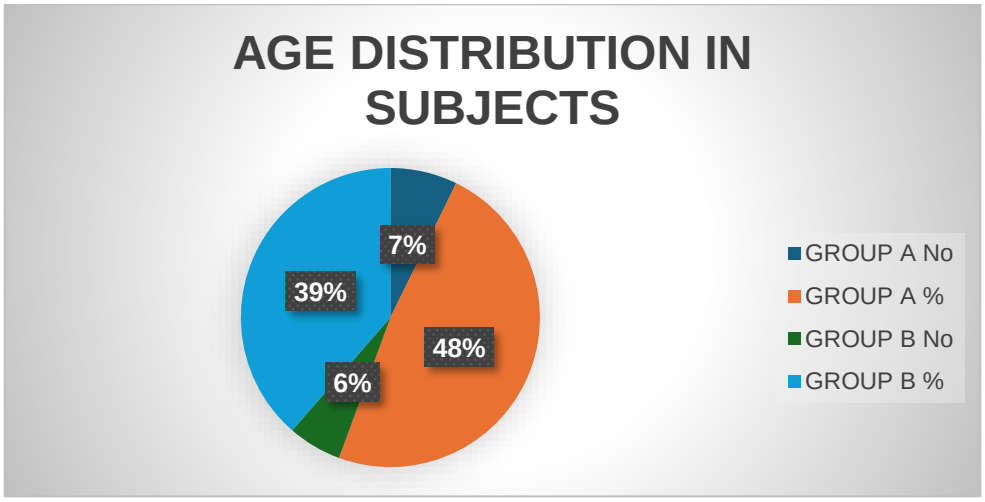
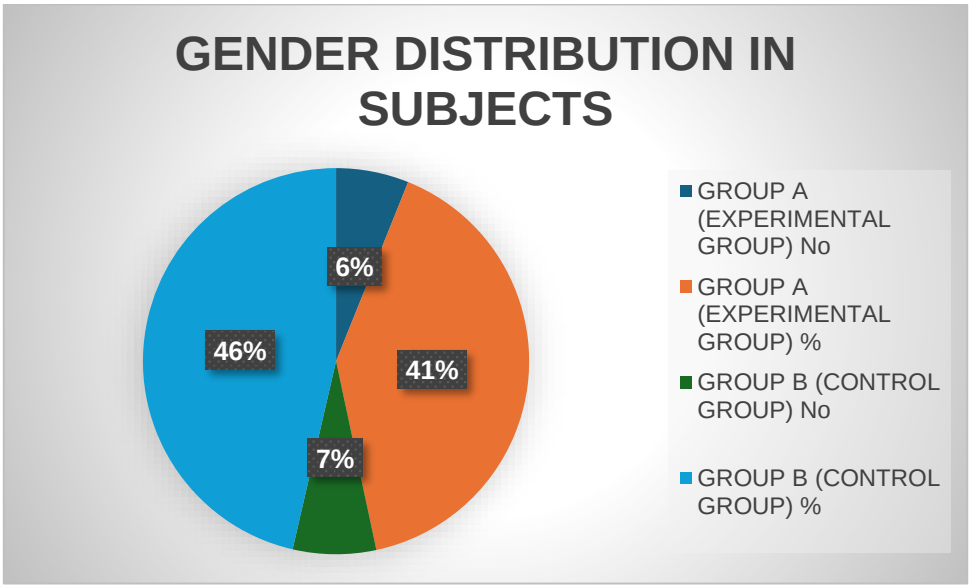
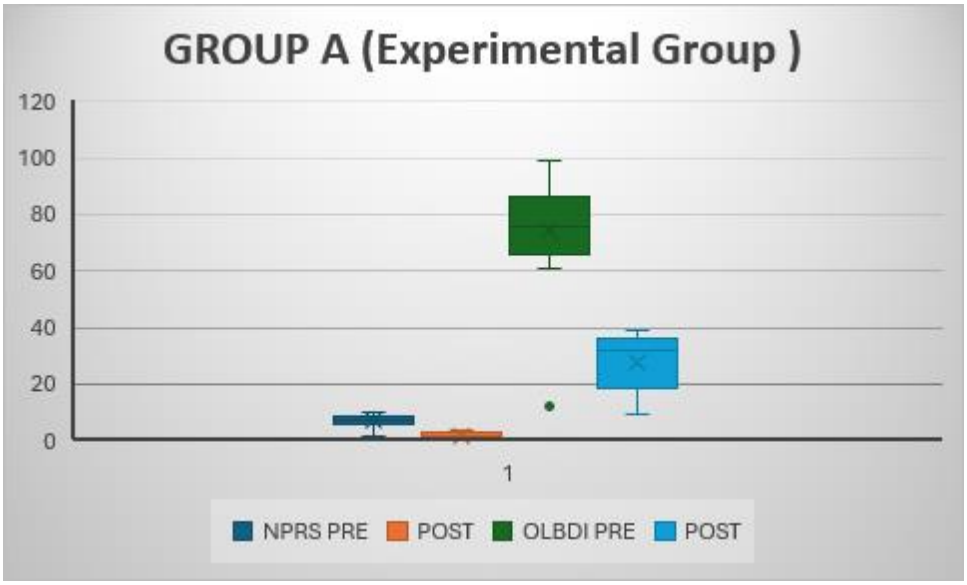


Table 2.0

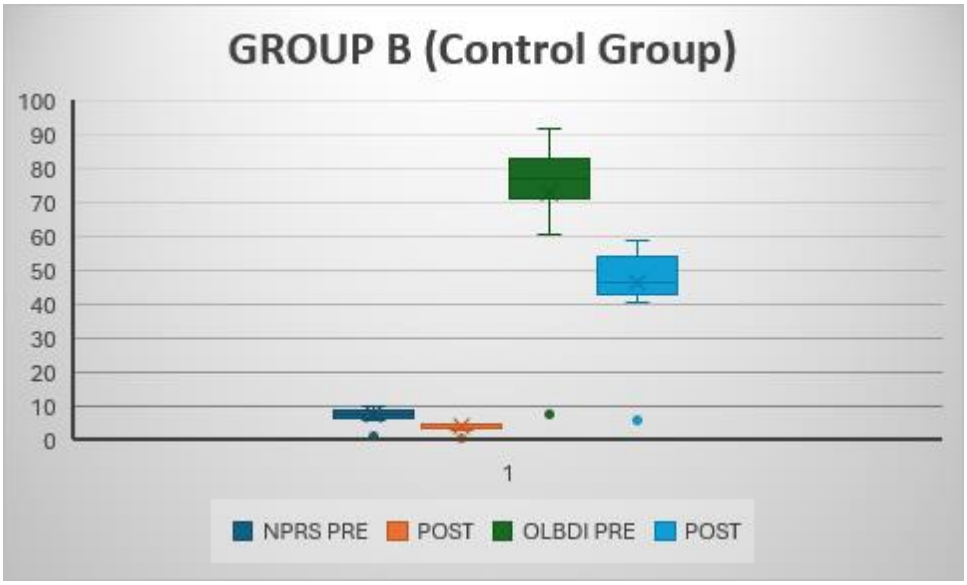
GENDER DISTRIBUTION IN SUBJECTS					
S.No	Gender	GROUP A (EXPERIMENTAL GROUP)		GROUP B (CONTROL GROUP)	
		No	%	No	%
1	FEMALE	7	46.6	8	53.3
2	MALE	8	53.3	7	46.6



GROUP A (Experimental Group)							
S. NO	OUTCOME MEASURES	PRE-TEST		POST-TEST		PAIRED T-TEST	
		RANGE	MEAN ± SD	RANGE	MEAN ± SD	T-STAST	P VALUE
1	NPRS	7-10	7.46 ± 1.54	0-4	2.0 ± 1.41	9.92	1.00E-07
2	OLBDI	60-100	78.0 ± 12.19	10-39	28.73 ± 9.70	12.69	4.56E-09



GROUP B (Control Group)							
S.No	OUTCOME MEASURES	PRE TEST		POST TEST		PAIRED T- TEST	
		RANGE	MEAN ± SD	RANGE	MEAN ± SD	T-STAST	P VALUE
1	NPRS	8-10	8.06 ± 1.33	3-5	4.33 ± 0.59	16.36	1.60E-10
2	OLBDI	70-100	77.4 ± 8.10	40-60	49.4 ± 6.09	10.73	3.87E-08



This study examines the results of an intervention in two groups, Group A (Experimental) and Group B (Control), using NPRS (Numeric Pain Rating Scale) and OLBDI (Oswestry Low Back Disability Index) as outcome measures. In Group A, the pretest NPRS scores ranged from 7 to 10, mean 7.46 ± 1.54, which decreased significantly postintervention to a range of 0 to 4, mean 2.0 ± 1.41, t = 9.92, p = 1.00E-07. Similarly, in this group the scores of OLBDI diminished remarkably from 60 to 100 (Mean = 78.0 ± 12.19) post-test range, 10 to 39, (Mean = 28.73 ± 9.70, t = 12.69, p = 4.56E-09). In Group B, the scores pre-test NPRS ranged from 8 to 10 with the mean being at 8.06 ± 1.33, and these were reduced to a range of 3 to 5 after intervention, but with a mean of 4.33 ± 0.59 (t = 16.36, p = 1.60E-10).

This group's OLBDI scores also improved, with the range changing from a pre-test of 70 to 100 (mean = 77.4 ± 8.10) to a post-test range of 40 to 60 (mean = 49.4 ± 6.09, t = 10.73, p = 3.87E-08). Although both groups showed a statistically significant change in pain and disability, greater improvements were reported in both outcomes for Group A. The post-test mean of the experimental intervention was lower than the control intervention both on NPRS with 2.0 vs 4.33 and OLBDI with 28.73 vs 49.4.

Discussion

The present study aims to evaluate the efficacy of McKenzie extension exercises with posterior-anterior (PA) central mobilization in patients with acute low back pain (LBP). It compares Group A, the experimental group, which received this combination of treatments, with Group B, the control group, which received interferential therapy (IFT) and hot packs, supplemented with spine isometric exercises instead of spinal mobilization.

Effectiveness of Interventions

The overall results showed significant differences between the two groups, as measured by the Numeric Pain Rating Scale (NPRS) and Oswestry Low Back Disability Index (OLBDI), both in pain and disability outcomes. Group A had a greater mean difference for NPRS scores from a mean of 7.46 ± 1.54 pre-intervention to 2.0 ± 1.41 post-intervention; in this case, incorporating McKenzie extension exercises and PA central mobilization may be considered effective. T-values and p-values in Group A (t = 9.92, p =

1.00E-07 and t = 12.69, p = 4.56E-09 for OLBDI) also support these results as being statistically significant.

In contrast, NPRS scores in Group B improved from a mean of 8.06 ± 1.33 to 4.33 ± 0.59 post-treatment, with equally impressive statistical significance (t = 16.36, p = 1.60E-10). However, although both groups demonstrated significant reductions in pain and disability, the magnitude of improvement was notably greater in Group A, suggesting that the specific combination of McKenzie exercises and PA central mobilization elicits a more potent therapeutic effect in acute LBP.

The McKenzie Method and Self-Treatment:

As reported by Erhard et al. (1999), in the study, they found that those subjects who received McKenzie self-treatment had a significant pain and disability reduction as compared to those subjects who underwent standard care. It is suggested that empowering the patient through self-treatment promotes better recovery.

Comparative Effectiveness:

- A systematic review conducted by Goerl et al. (2017) showed that exercise therapy is significantly superior, especially with McKenzie exercises, than the traditional modes of treatment for chronic and acute low back pain. The review showed that patients who used McKenzie principles had better outcomes in terms of pain relief and functional outcomes.

Spinal Mobilization:

Results: In a randomized controlled trial by Hsieh et al. (2009), patients who received spinal mobilization together with exercise reported more pronounced reductions in pain and a better level of functionality compared to those who received exercise alone. These findings for their part validate the hypothesis that combined treatment approaches might result in more favorable outcomes in the management of LBP.

Combination Treatment Approaches:

- A Kirtman et al. study conducted in 2019 concluded that incorporating mobilization into exercise therapy significantly improved patients suffering from acute low back pain and that multi-modal interventions improved outcomes and satisfaction.

These results suggest that McKenzie extension exercises in conjunction with PA central mobilization not only reduce pain more significantly than traditional isometric exercises in this patient population but also improve functional mobility, as evidenced by the OLBDI scores. The pre-to-post intervention change in OLBDI for Group A was dramatic, with a mean decrease from 78.0 ± 12.19 to 28.73 ± 9.70. This represents a worthwhile improvement in activities of daily living in patients; this is important in the treatment of acute LBP.

Direct mobilization of lumbar spinal segments by the experimental group can lead to better synovial fluid movement, reduction of intradiscal pressure, and healing within discrete regions of the spine. McKenzie exercises, with a focus on extension, may also be beneficial to assist in reversal of poses leading to discogenic pain to recover faster.

Conclusion

Overall, the results of this study emphasize the value of McKenzie extension exercises in combination with PA central mobilization as interventions for acute low back pain. Significant decreases in pain and disability measures among the experimental group underscore the importance of integrating such therapy techniques into clinical practice to ensure the best possible patient outcomes. As the discipline continues to advance, future studies will play a vital role in refining treatment protocols and improving care for patients.

Limitation and Suggestion

This study offers insight into this particular combined modality of treatment. However, some limitations should be kept in mind: small sample size and a relatively short period of intervention. Larger cohorts with longer follow-up periods should be conducted to establish the long-term results of these treatment modalities. Also, identification of patient-specific characteristics that could most benefit from this approach would be beneficial.

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