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EFFECTS OF MANUAL PRESSURE RELEASE VERSUS STRAIN COUNTERSTRAIN ON REDUCING PAIN AND IMPROVING HIP MOBILITY IN NON-SPECIFIC CHRONIC LOW BACK PAIN

Original Research

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ABSTRACT

Background: Chronic low back pain (CLBP) is a prevalent musculoskeletal condition that significantly impacts mobility, functional capacity, and overall quality of life. Effective physiotherapeutic interventions are crucial for pain relief and functional improvement. Manual pressure release (MPR) and strain counterstrain (SCS) are widely used techniques targeting myofascial dysfunction, yet their comparative efficacy remains underexplored. Understanding their impact on pain reduction and hip range of motion (ROM) can enhance clinical decision-making and optimize rehabilitation outcomes for individuals with non-specific CLBP.

Objective: To compare the effects of manual pressure release and strain counterstrain techniques on pain intensity and hip ROM in individuals with non-specific CLBP.

Methods: A randomized clinical trial was conducted on 92 participants (49.2% males, 50.8% females) aged 25 to 40 years with non-traumatic CLBP persisting for more than three months. Participants were recruited through convenient sampling and randomly assigned to two intervention groups. Group A received manual pressure release, while Group B underwent strain counterstrain therapy. Both interventions were administered three times per week for eight weeks. Pain intensity was assessed using the Visual Analog Scale (VAS), and hip ROM (flexion and extension) was measured using a goniometer. Pre- and post-intervention comparisons were conducted using the Wilcoxon Signed-Rank Test for VAS and paired samples t-test for hip ROM. Between-group differences were analyzed using the Mann-Whitney U Test for VAS and independent samples t-test for hip ROM, with statistical significance set at $p<0.05$.

Results: Within-group analysis revealed significant improvements in VAS scores in both groups ($p<0.001$). Group A showed a reduction in pain from 4.7±0.8 to 1.2±1.05, whereas Group B demonstrated a decrease from 5.3±1.2 to 2.2±1.4. Hip ROM also improved significantly in both groups ($p<0.001$). In Group A, right hip flexion increased from 60.4±4.7° to 73.6±5.1°, and left hip flexion from 57.5±4.7° to 73.4±4.5°, while right hip extension improved from 13.3±3.1° to 22.2±2.5° and left hip extension from 15.3±2.6° to 21.4±2.4°. In Group B, right hip flexion increased from 61.7±6.5° to 71.5±5.1°, and left hip flexion from 61.0±4.2° to 70.2±4.1°, while right hip extension improved from 13.08±2.5° to 16.71±1.3° and left hip extension from 12.21±2.9° to 16.61±1.7°. Between-group analysis indicated that Group A achieved significantly greater improvements in pain reduction ($p=0.032$) and hip ROM ($p<0.05$) compared to Group B.

Conclusion: Both manual pressure release and strain counterstrain techniques were effective in reducing pain and improving hip ROM in individuals with CLBP. However, manual pressure release demonstrated superior efficacy in enhancing hip flexion and extension and reducing pain severity, making it a potentially more effective therapeutic option for CLBP management.

Keywords: Back pain, Chronic pain, Manual therapy, Myofascial pain, Physical therapy modalities, Rehabilitation, Range of motion.

INTRODUCTION

Chronic low back pain (LBP) is associated with major medical and psychosocial concerns, with an anticipated yearly incidence of 15-45% and a lifelong incidence of 23 percent. Lower back pain has an extensive variety of reasons, and in around 90% of clients, the precise cause is unable to identify with assurance. The aetiology of persistent LBP can't be accurately determined by clinical testing. It has been determined that seven million individuals in the United States have reduced flexibility, resulting in persistent low back discomfort (1).

Nonspecific persistent low backache pain is characterized as hurting in the region of the lumbar area between the lower gluteal folds to the twelfth ribcage. LBP is somewhat prevalent and coincides with substantial impairment. Low back pain, also known as lumbago, is an umbrella term for a condition which strikes the muscular tissues, nerve cells, and the skeletal system of the back, specifically around the bottom border of the ribcage and the rear folding of the buttocks. Chronic lower back pain is interpreted as having an occurrence of over three months of pain and no clinical manifestations (2). Chronic low back pain is an important contributor of developmental disabilities globally. Multiple research investigations aim in order to underscore the data validating the various rehabilitative strategies mentioned for managing it (3). Nerve root compression, SIJ dysfunction, lumber lordosis, muscular stiffness, lumber straightening, vertebral fracture are also create the symptoms of LBP (4).

Muscles responsible for hip flexion play a crucial part in lumbar spine stabilization. Tightened flexors of the hip may trigger lumbar spinal discomfort and, as a result, productivity limitations. (5) The hip flexors include several muscles, which originate on the pelvis, spine or sacrum and insert onto the lower limb. The abdominal muscles provide stability when the hip flexors are working and mobilising – without this, the pelvis can be pulled into anterior pelvic tilt when, for example, lifting the knee. The hip flexors are also under constant tension and can become shortened or tight because of habitual postural positioning which can then also create an anteriorly tilted pelvis and exaggerated lumbar lordosis. Pain in the back is among the top causes of medical leave, and by the age of thirty, almost half of individuals will have had a serious occurrence of backache (6).

Manual pressure technique and Strain counterstrain (SCS) are two types of therapeutic approaches that are commonly used to alleviate pain and enhance range of mobility. Manual pressure method is achieved through the use of reasonably agonising persistent mechanical force against an MTrP's tissue restriction, frequently with the thumbs or tips of the finger (7). It is a manual treatment procedure that involves gradually increasing force on myofascial trigger points until 70% of the recipient's discomfort is gone. The pressure is kept for 60 seconds before being examined to confirm that it remains constant. If the individual stated that the level of discomfort had decreased to 30%, the examiner gradually increased the pressure to restore the perceived pain to 70%. Depending on the type and cause of the distress, the therapy seeks to relieve pain, improve quality of life, reduce sacrolumbar angle or lordosis, and improve performance (8). In order to lessen the associated pathology, strain counter strain (SCS) is a comprehensive physical examination and therapy technique that makes use of sore regions and a comfortable posture. The comfortable posture is maintained and the tender point is used as an indication. The muscular system is usually at its most compact length in this minimally unpleasant posture. The joint's mobility is gradually and passively returned to its neutral position after ninety seconds. This prolonged contraction of the muscle diminishes the muscle's extrafusal and intrafusal fibers (9).

The rationale for this study was to examine and assess the efficacy of two therapy approaches, manual pressure release and strain counterstrain technique, in alleviating the symptoms of CLBP. The study intends to provide a better understanding of the effects of these techniques on pain levels and hip range of motion hence giving significant information for optimising treatment options for those suffering with CLBP. The findings will enhance clinical decision-making and inform treatment strategies. Ultimately, this research will contribute to improved patient outcomes and elevate the quality of musculoskeletal healthcare.

METHODS

A randomized clinical trial was conducted to compare the effects of manual pressure release and strain counterstrain techniques on pain reduction and hip mobility improvement in individuals with non-specific chronic low back pain (CLBP). Participants were recruited through a convenient sampling method and randomly allocated into two groups using the lottery method. The study was completed over

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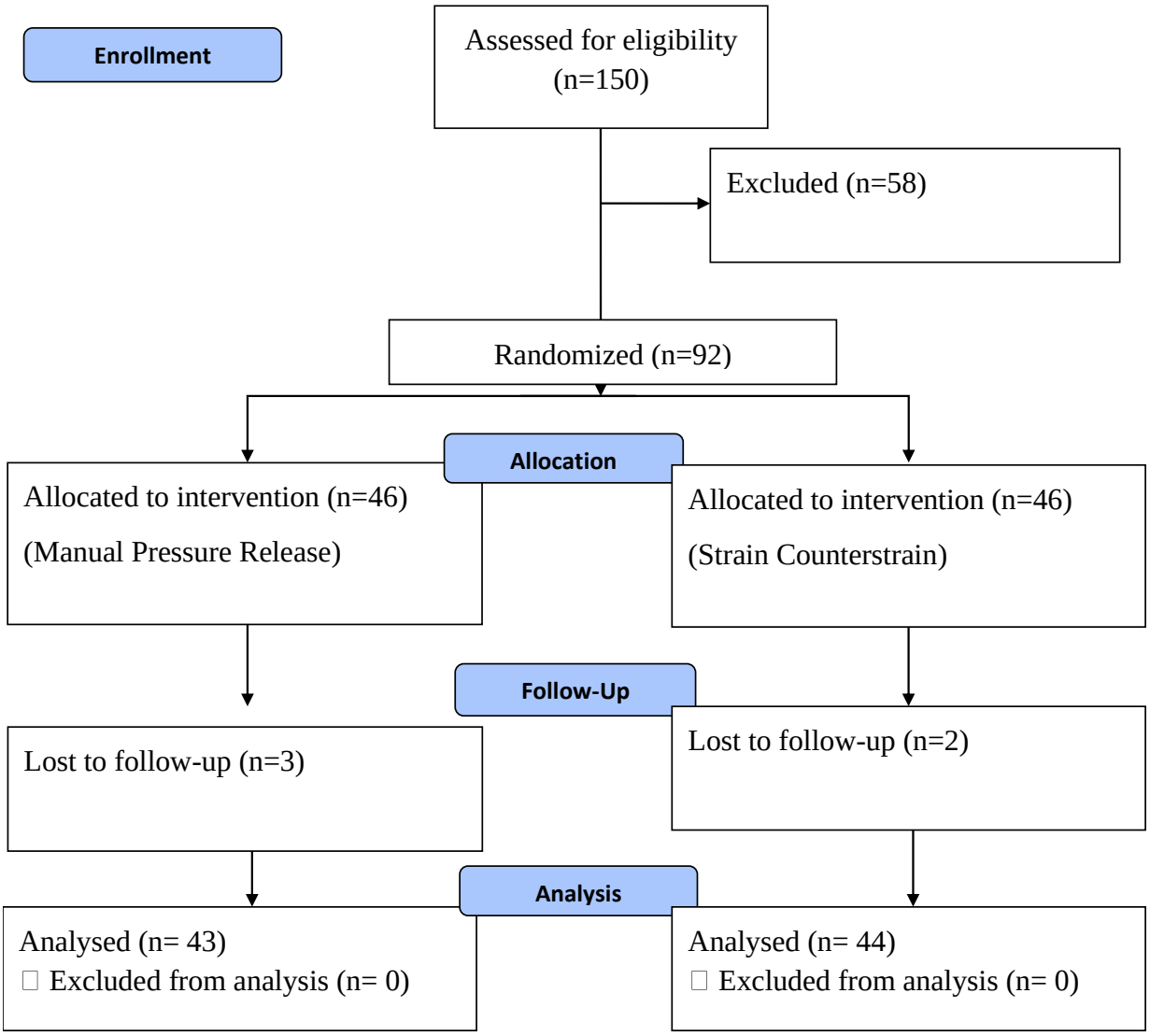
approximately nine months, from 2023 to 2024. The sample size was determined to be 92, incorporating a 20% attrition rate to account for potential dropouts.

The inclusion criteria encompassed male and female individuals aged 25 to 40 years with non-traumatic CLBP persisting for more than three months. Participants were excluded if they had a history of vertebral fractures, prior spinal surgery, disc disease, osteoporosis, other bone disorders, scoliosis, radiculopathy, pregnancy, or unwillingness to provide informed consent. Prior to enrollment, all participants provided written informed consent after completing a subjective assessment. Ethical approval was obtained from the Institutional Review Board (IRB), and strict confidentiality of participant data was ensured.

Group A received manual pressure release therapy, while Group B underwent treatment with the strain counterstrain technique. Both interventions were administered three times per week for eight weeks. Pain levels and hip mobility, including flexion and extension, were assessed at baseline and at the end of the eighth week using the Visual Analog Scale (VAS) and a goniometer. The Kolmogorov–Smirnov test was applied to assess data normality, determining the suitability of parametric or non-parametric statistical tests. Data entry and analysis were performed using SPSS version 25, with statistical significance set at $p < 0.05$.

Figure 1: Flow diagram



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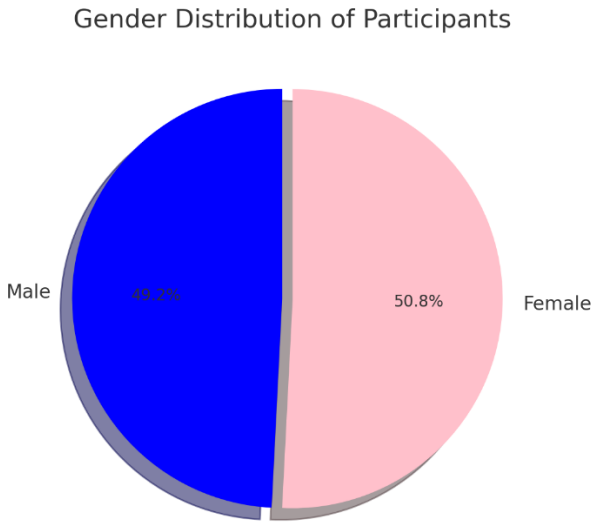
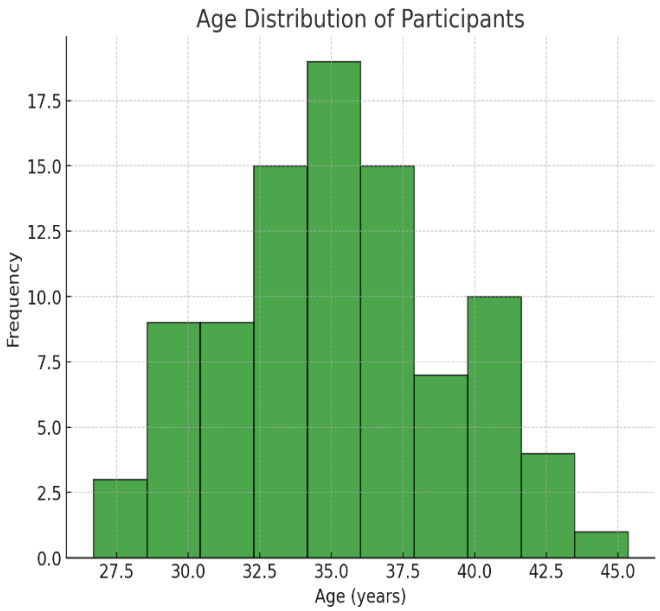
RESULTS





Gender Distribution chart illustrates the gender distribution of study participants, showing a nearly equal representation of males (49.2%) and females (50.8%), ensuring balanced demographic participation in the study.

Age Distribution histogram represents the age distribution of participants, centered around a mean age of 35.6 years (±3.7). The spread indicates a normal distribution, reflecting a well-defined sample population within the inclusion criteria.

About 49.2% of the individuals who took part were males, and 50.8% were females. Mean age of the participants were 35.6±3.7. The normality result on outcome measures was determined by the Kolmogorov–Smirnov test, the VAS contradicts the presumptions relating to normality. Consequently, non-parametric analyses were utilized to analyze data from the VAS. Wilcoxon Signed-Rank Test was applied for within-group analysis, while the Mann-Whitney U Test was employed for between-group comparison. Because the hip ROM was found to follow a normality distribution, parametric tests were utilized to analyze the data of the bilateral hip ROM. The paired samples t-test was the method of choice for within-group evaluation, while the independent samples t-test was executed for between-group comparisons. The threshold of significance was set at 0.05.

Table 1: Within-group interpretation of VAS

		N	Mean±S.D	Median	Asymp. Sig. (2-tailed)
Manual Pressure technique	VAS at baseline	46	4.7±0.8	5.00	<0.001
(Group A)	VAS after 8 weeks	43	1.2±1.05	1.00	
Strain Counterstrain	VAS at baseline	46	5.3±1.2	5.00	<0.001
(Group B)	VAS after 8 weeks	44	2.2±1.4	2.00	

The study included 92 participants, with 49.2% males and 50.8% females. The mean age of the participants was 35.6±3.7 years. The normality of the data was assessed using the Kolmogorov–Smirnov test. The results indicated that the Visual Analog Scale (VAS) scores did not conform to normality assumptions; therefore, non-parametric tests were applied. The Wilcoxon Signed-Rank Test was used for within-group analysis of VAS, while the Mann-Whitney U Test was used for between-group comparisons. In contrast, hip range of motion (ROM) followed a normal distribution, warranting the use of parametric tests. The paired samples t-test was applied for within-group comparisons, and the independent samples t-test was employed for between-group analysis. A significance level of $p<0.05$ was used to determine statistical differences.

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Table 2: Hip flexion and extension (Within-group evaluation)

		N	Mean	Asymp. Sig. (2-tailed)
Manual Pressure technique (Group A)	(R)flex at baseline	46	60.4±4.7	<0.001
	(R) flex after 8 weeks	43	73.6±5.1	
	(L) flex at baseline	46	57.5±4.7	<0.001
	(L) flex after 8 weeks	43	73.4±4.5	
	(R) ext at baseline	46	13.3±3.1	<0.001
	(R) ext after 8 weeks	43	22.2±2.5	
	(L) ext at baseline	46	15.3±2.6	<0.001
	(L) ext after 8 weeks	43	21.4±2.4	
Strain Counterstrain (Group B)	(R)flex at baseline	46	61.7±6.5	<0.001
	(R) flex after 8 weeks	44	71.5±5.1	
	(L) flex at baseline	46	61.0±4.2	<0.001
	(L) flex after 8 weeks	44	70.2±4.1	
	(R) ext at baseline	46	13.08±2.5	<0.001
	(R) ext after 8 weeks	44	16.71±1.3	
	(L) ext at baseline	46	12.21±2.9	<0.001
	(L) ext after 8 weeks	44	16.61±1.7	

Within-group analysis demonstrated a statistically significant improvement in VAS scores in both intervention groups following eight weeks of treatment ($p<0.001$). Participants in the manual pressure release group showed a reduction in pain scores from 4.7±0.8 at baseline to 1.2±1.05 after treatment. Similarly, the strain counterstrain group exhibited a decrease from 5.3±1.2 at baseline to 2.2±1.4 post-intervention.

Table 3: Between-group comparison of NPRS and disability

	VAS at baseline	VAS following 8 weeks
Mann-Whitney U	229.500	130.000
Wilcoxon W	505.500	340.000
Z	-.770	-2.149
Asymp. Sig. (2-tailed)	.441	.032

Significant improvements were observed in hip ROM across both groups following treatment. In the manual pressure release group, right hip flexion increased from 60.4±4.7° at baseline to 73.6±5.1°, while left hip flexion improved from 57.5±4.7° to 73.4±4.5°. Right hip extension increased from 13.3±3.1° to 22.2±2.5°, and left hip extension improved from 15.3±2.6° to 21.4±2.4° ($p<0.001$ for all comparisons). Similarly, in the strain counterstrain group, right hip flexion improved from 61.7±6.5° to 71.5±5.1°, left hip flexion increased from 61.0±4.2° to 70.2±4.1°, right hip extension improved from 13.08±2.5° to 16.71±1.3°, and left hip extension increased from 12.21±2.9° to 16.61±1.7° ($p<0.001$ for all comparisons).

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Table 4: Hip flexion and extension B/W groups comparison

		N	Mean±S.D	P-value
(R) hip flex at baseline	Group A	23	60.4±4.7	0.824
	Group B	23	61.7±6.5	
(R) hip flexion after 4 weeks	Group A	21	73.6±5.1	0.023
	Group B	20	71.5±5.1	
(L) hip flex at baseline	Group A	23	57.5±4.7	0.169
	Group B	23	61.0±4.2	
(L) hip flex after 4 weeks	Group A	21	73.4±4.5	0.007
	Group B	20	70.2±4.1	
(R) hip extension at baseline	Group A	23	13.3±3.1	0.139
	Group B	23	13.08±2.5	
(R) hip ext after 4 weeks	Group A	21	22.2±2.5	0.000
	Group B	20	16.71±1.3	
(L) hip ext at baseline	Group A	23	15.3±2.6	0.153
	Group B	23	12.21±2.9	
(L) hip ext after 4 weeks	Group A	21	21.4±2.4	0.000
	Group B	20	16.61±1.7	

Between-group comparisons revealed significant differences in VAS scores after eight weeks of treatment ($p=0.032$), indicating greater pain reduction in the manual pressure release group than in the strain counterstrain group. Hip ROM analysis showed no significant differences between groups at baseline ($p>0.05$). However, after eight weeks, the manual pressure release group exhibited significantly greater improvements in right hip flexion ($p=0.023$), left hip flexion ($p=0.007$), right hip extension ($p<0.001$), and left hip extension ($p<0.001$) compared to the strain counterstrain group.

DISCUSSION

The findings of this study align with the conclusions drawn by Al-Shawabka, who investigated the effectiveness of manual pressure release (MPR) and positional release therapy (PRT) on myofascial trigger points in the upper trapezius muscle. That study demonstrated that MPR was significantly more effective than PRT in alleviating pain and improving mobility within a shorter time frame, supporting the results of the present research. While Al-Shawabka's study primarily focused on the upper trapezius, the current investigation extended these findings by applying an eight-week intervention period in chronic low back pain (CLBP) patients. The observed outcomes further reinforced that MPR provided superior pain relief, greater improvements in range of motion (ROM), and enhanced functionality in individuals with CLBP. However, the long-term effects of these interventions require further exploration, as limited research has assessed their sustained impact (10).

In contrast, the pilot study conducted by IO Dayanr and colleagues in 2020 reported differing findings. That study evaluated the effectiveness of MPR, strain counterstrain (SCS), and the integrated neuromuscular inhibition technique (INIT) in managing nonspecific CLBP. The intervention consisted of twelve treatment sessions combined with a standardized home exercise program for 48 participants. Unlike the present study, which directly compared two intervention techniques, their findings suggested that SCS or INIT may offer slightly better pain relief during physical activity and deactivation of myofascial trigger points (11). Despite this, the current research

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established that MPR led to more substantial reductions in pain and disability and demonstrated a greater improvement in hip ROM, further strengthening its therapeutic role in CLBP rehabilitation.

The beneficial effects of strain counterstrain therapy were also reaffirmed by previous research. Wong et al. conducted a study in 2004 on forty-nine individuals with bilateral hip-sensitive areas, demonstrating that SCS led to a significant reduction in muscular discomfort and tenderness following intervention (12). Similarly, Collin described the positive impact of PRT on pain reduction and functional improvement in a pediatric case of a grade-two ankle sprain. After two months of intervention, ten of the thirteen problematic areas exhibited reduced tenderness, with a two-point decrease in pain severity on the Numerical Pain Rating Scale (NPRS), suggesting a clinically meaningful analgesic effect that warranted further investigation (13). Eisenhart's research on osteopathic manual therapy (OMT), which includes techniques such as myofascial release, muscle stretching, and positional release, also reported notable improvements in pain, swelling reduction, and increased ROM in patients with acute ankle sprains (14). In the context of lower back pain, Ali et al. demonstrated a significant reduction in VAS pain scores after a single session of PRT, emphasizing its effectiveness in immediate pain relief (15). The current study further corroborated these findings, showing that both SCS and MPR effectively alleviated pain and enhanced hip mobility. However, a greater magnitude of improvement was observed in the MPR group, indicating its superior efficacy in managing CLBP symptoms (16).

Although several studies have validated the role of SCS in addressing muscular pain and myofascial trigger point tenderness, there remains limited evidence regarding its effectiveness in improving functional impairments (17). A randomized controlled trial investigating the immediate effects of SCS on sensory parameters in digitally sensitive areas of the lower back demonstrated a notable reduction in tenderness, reinforcing its role in pain modulation (18). However, the present study compared MPR and SCS interventions over an extended eight-week period, revealing that while both techniques contributed to pain reduction and ROM enhancement, MPR yielded significantly greater improvements. These findings suggest that MPR may offer more pronounced therapeutic benefits in the rehabilitation of CLBP patients (19). A major strength of this study was its randomized design, which minimized selection bias and improved the reliability of findings (20). The inclusion of an eight-week follow-up allowed for a more comprehensive assessment of treatment effects beyond immediate post-intervention outcomes. The study also utilized validated outcome measures, ensuring the robustness of its findings (21). However, certain limitations should be acknowledged. The sample size was relatively small, limiting the generalizability of results to a broader population (22). Additionally, external factors such as participants' engagement in supplementary interventions, self-medication, or varying adherence to home exercises could not be entirely controlled, potentially influencing the study outcomes (23).

To enhance the applicability of findings, future studies should be conducted with larger sample sizes across multiple locations. A triple-blind randomized controlled trial (RCT) design is recommended to further minimize potential biases and strengthen evidence regarding the comparative effectiveness of these interventions (24). Healthcare providers should consider integrating both MPR and SCS techniques into clinical practice, tailoring treatment approaches based on individual patient responses to optimize rehabilitation outcomes (25). The results of this study demonstrated that both MPR and SCS were effective in alleviating pain and improving hip ROM in individuals with CLBP. However, MPR exhibited a greater degree of statistical significance in reducing pain severity on VAS and enhancing hip ROM, reinforcing its potential as a preferred therapeutic intervention for CLBP management (26).

CONCLUSION

The findings of this study highlight the effectiveness of both manual pressure release and strain counterstrain techniques in managing chronic low back pain and improving hip mobility. While both interventions contributed to pain reduction and functional enhancement, manual pressure release demonstrated a more pronounced impact in alleviating discomfort and increasing mobility. The results reinforce the potential of these techniques as valuable therapeutic options in rehabilitation settings. However, considering variations in individual responses, integrating tailored treatment approaches into clinical practice could optimize patient outcomes. Future research with larger sample sizes and extended follow-up periods is recommended to further validate these findings and explore the long-term benefits of these interventions.

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Author Contribution

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Areej Tabasum	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muneeba Najeeb	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Misbah Tassawur	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Farwa Khaliq	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Kainat Malik	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Noor Ul Huda	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Iqra Shoukat	Writing - Review & Editing, Assistance with Data Curation
Urooj Manzoor	Writing - Review & Editing, Assistance with Data Curation

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