

# Comparing the Effectiveness of Various Manual Therapy Techniques in Treating Chronic Lower Back Pain: A Randomized Controlled Trial

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## Abstract

**Background:** Chronic lower back pain (CLBP) is a prevalent condition often managed with manual therapy techniques. This study aimed to compare the effectiveness of spinal manipulation, mobilization, and massage therapy on pain relief and functional improvement in CLBP patients.

**Methods:** A randomized controlled trial was conducted with 135 participants allocated into three groups: spinal manipulation (n=45), mobilization (n=45), and massage therapy (n=45). Pain and function were assessed using the Visual Analog Scale (VAS) and Oswestry Disability Index (ODI), respectively, at baseline, immediately post-treatment, and at 3-month follow-up. Quality of life and patient satisfaction were also evaluated.

**Results:** All interventions significantly reduced pain and improved function ( $p < 0.001$ ). Spinal manipulation provided greater pain relief immediately post-treatment and at 3-month follow-up compared to mobilization and massage therapy ( $p = 0.03$  and  $p = 0.02$ , respectively). Mobilization resulted in the greatest functional improvement ( $p = 0.04$  and  $p = 0.03$ , respectively). Quality of life improvements and patient satisfaction were similar across groups.

**Conclusion:** Spinal manipulation, mobilization, and massage therapy are all effective in managing CLBP, with spinal manipulation offering superior pain relief and mobilization yielding the most significant functional gains. These findings support the tailored use of manual therapy techniques based on individual patient needs and clinical goals.

## Introduction

Chronic lower back pain (CLBP) is a pervasive and debilitating condition affecting millions of individuals worldwide. It is a leading cause of disability and has significant socioeconomic implications, including lost work productivity and increased healthcare costs. Despite its prevalence, effective management of CLBP remains a challenge due to its multifactorial etiology and complex pathophysiology.

Manual therapy is a commonly employed intervention for CLBP, encompassing a variety of techniques aimed at alleviating pain and improving function. These techniques include spinal manipulation, mobilization, and massage therapy, each with distinct mechanisms of action and clinical applications. Spinal manipulation, for instance, involves high-velocity, low-amplitude thrusts applied to specific joints, purportedly to improve joint function and reduce pain. Mobilization, on the other hand, consists of slower, repetitive movements designed to increase joint range of motion without the abrupt forces used in manipulation. Massage therapy, which includes techniques such as myofascial release and trigger point therapy, focuses on manipulating soft tissues to relieve muscle tension and pain.

Previous studies have demonstrated varying degrees of effectiveness for these manual therapy techniques. For example, a systematic review by Rubinstein et al. (2012) found moderate evidence supporting spinal manipulation for short-term pain relief in CLBP patients. Similarly, a meta-analysis by Kuczynski et al. (2012) highlighted the benefits of mobilization in improving functional outcomes. Massage therapy has also been shown to provide significant pain relief and enhance quality of life in CLBP patients, as reported by AD, (2008).

Despite the existing evidence, there is a lack of comprehensive studies directly comparing the efficacy of these different manual therapy techniques in treating CLBP. Addressing this gap is crucial for informing clinical practice and optimizing treatment strategies for patients with CLBP. This study aims to compare the outcomes of spinal manipulation, mobilization, and massage therapy on pain relief and functional improvement in patients with chronic lower back pain. We hypothesize that while all three techniques will provide significant benefits, there will be differences in their effectiveness, with some techniques proving more advantageous for certain outcomes than others.

By conducting a randomized controlled trial, this study seeks to provide robust evidence on the relative efficacy of these manual therapy techniques, thereby guiding clinicians in selecting the most appropriate interventions for their patients with CLBP.

## Literature Review

Chronic lower back pain (CLBP) is a condition with substantial prevalence and impact, leading to significant personal and societal burden. Given the multifaceted nature of CLBP, a variety of treatment modalities have been explored, among which manual therapy techniques have gained prominence. This literature review examines the current evidence on three primary manual therapy techniques: spinal manipulation, mobilization, and massage therapy, and their effectiveness in treating CLBP.

**Spinal Manipulation:** Spinal manipulation, commonly performed by chiropractors, osteopaths, and physical therapists, involves high-velocity, low-amplitude thrusts to the spine. This technique aims to restore joint mobility, reduce pain, and improve function. A comprehensive review by Rubinstein et al. (2012) found moderate evidence supporting the efficacy of spinal manipulation in providing short-term pain relief and functional improvement in patients with acute and chronic lower back pain. The review highlighted the necessity for high-quality randomized controlled trials (RCTs) to further substantiate these findings .

A meta-analysis by Assendelft et al. (2003) corroborated these findings, indicating that spinal manipulation is associated with statistically significant, albeit modest, improvements in pain and function compared to other interventions such as sham therapy or analgesic medication . However, the authors emphasized the variability in outcomes due to differences in study designs, patient populations, and intervention protocols.

**Mobilization:** Mobilization, characterized by slower, repetitive movements within the patient's range of motion, is another manual therapy technique used to treat CLBP. It is designed to enhance joint function and reduce pain without the high-velocity thrusts associated with spinal manipulation. A systematic review by Kuczynski et al. (2012) demonstrated that mobilization is effective in improving pain and functional outcomes in patients with CLBP. The review included 15 RCTs and found consistent evidence supporting the use of mobilization, particularly when combined with other therapeutic exercises.

Moreover, a study by French et al. (2006) compared the effects of spinal mobilization and manipulation and found no significant difference between the two in terms of pain relief and functional improvement. This suggests that both techniques may be similarly effective, although patient preference and clinical context should guide the choice of intervention.

**Massage Therapy:** Massage therapy, which includes techniques such as myofascial release, trigger point therapy, and deep tissue massage, focuses on manipulating soft tissues to alleviate pain and improve function. AD, (2008) conducted a Cochrane review that provided strong evidence for the short-term benefits of massage therapy in reducing pain and improving function in patients with CLBP . The review included 25 trials and highlighted the positive effects of massage therapy compared to inactive treatments such as placebo or sham therapy.

In addition, a study by Moraska et al. (2010) found that massage therapy significantly improved pain and functional outcomes in patients with CLBP, with effects lasting up to one year post-treatment. This suggests that massage therapy may offer both immediate and sustained benefits for individuals with CLBP .

**Comparative Studies:** Despite the extensive research on individual manual therapy techniques, there is a paucity of studies directly comparing the effectiveness of these interventions. A comparative study by Licciardone et al. (2003) compared osteopathic manipulative treatment (which includes elements of both manipulation and mobilization) with standard care and found superior outcomes in the treatment group. However, the study did not isolate the effects of manipulation and mobilization, limiting its applicability to understanding the relative efficacy of these techniques .

Furthermore, a review by Bronfort et al. (2010) compared various physical treatments for CLBP and concluded that spinal manipulation and mobilization are effective treatment options, with no clear superiority of one technique over the other. The review called for more rigorous comparative studies to delineate the optimal manual therapy approaches for CLBP .

**Gaps in the Literature:** While there is substantial evidence supporting the use of manual therapy techniques for CLBP, several gaps remain. There is a need for high-quality, large-scale RCTs that directly compare the effectiveness of spinal manipulation, mobilization, and massage therapy. Additionally, long-term follow-up studies are required to determine the sustained benefits of these interventions. Understanding patient-specific factors that influence treatment outcomes, such as baseline pain severity, psychological status, and comorbidities, is also crucial for tailoring interventions to individual needs.

In summary, the literature supports the efficacy of spinal manipulation, mobilization, and massage therapy in treating CLBP, with each technique offering unique benefits. However, the lack of direct comparative studies highlights the need for further research to determine the most effective manual therapy approach for this condition. Addressing these gaps will enhance clinical decision-making and improve patient outcomes in the management of chronic lower back pain.

## Methods

**Study Design:** This study was a randomized controlled trial (RCT) designed to compare the effectiveness of three different manual therapy techniques—spinal manipulation, mobilization, and massage therapy—in treating patients with chronic lower back pain (CLBP). The trial was conducted in a tertiary hospital over a period of 12 months. The study protocol was approved by the ethics committee, and all participants provided written informed consent.

## Participants

### Inclusion Criteria

- Adults aged 18-65 years.
- Diagnosed with chronic lower back pain persisting for more than 12 weeks.
- Able to provide informed consent and comply with the study protocol.

### Exclusion Criteria

- Presence of red flags for serious spinal pathology (e.g., cauda equina syndrome, spinal fracture, malignancy).
- Previous spinal surgery.
- Concurrent participation in another clinical trial.
- Pregnancy.
- Severe psychiatric disorders.

Participants were recruited through orthopedic outpatients clinics . A total of 150 participants were enrolled and randomly assigned to one of three intervention groups: spinal manipulation (n=50), mobilization (n=50), and massage therapy (n=50).

## Interventions

**Spinal Manipulation:** Participants in the spinal manipulation group received high-velocity, low-amplitude thrusts applied to the lumbar spine. Treatments were administered by licensed chiropractors with a minimum of five years of clinical experience. Each session lasted 30 minutes, and participants received two sessions per week for six weeks.

**Mobilization:** Participants in the mobilization group received slow, repetitive movements within their pain-free range of motion. These treatments were administered by licensed physical therapists with at least five years of experience. Each session lasted 30 minutes, and participants received two sessions per week for six weeks.

**Massage Therapy:** Participants in the massage therapy group received techniques such as myofascial release, trigger point therapy, and deep tissue massage, focusing on the lumbar region. Treatments were provided by licensed massage therapists with a minimum of five years of clinical experience. Each session lasted 30 minutes, and participants received two sessions per week for six weeks.

## Outcome Measures

### Primary Outcomes

- **Pain Relief:** Assessed using the Visual Analog Scale (VAS), where participants rated their pain on a scale from 0 (no pain) to 10 (worst possible pain). Measurements were taken at baseline, immediately post-treatment, and at 3-month follow-up.
- **Functional Improvement:** Assessed using the Oswestry Disability Index (ODI), which measures the degree of disability related to lower back pain. Scores range from 0% (no disability) to 100% (total disability). Assessments were conducted at baseline, immediately post-treatment, and at 3-month follow-up.

### Secondary Outcomes

- **Quality of Life:** Evaluated using the Short Form-36 Health Survey (SF-36). This instrument includes eight scales covering physical functioning, bodily pain, general health, vitality, social functioning, role limitations due to physical health, role limitations due to emotional problems, and mental health. Assessments were conducted at baseline, immediately post-treatment, and at 3-month follow-up.
- **Patient Satisfaction:** Measured using a Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). Collected immediately post-treatment.

**Data Collection:** Data were collected by blinded assessors who were not involved in the delivery of the interventions. All assessments were conducted at three time points: baseline, immediately post-treatment, and at a 3-month follow-up. Data were entered into a secure electronic database and checked for accuracy by a second independent researcher.

**Data Analysis:** Statistical analyses were performed using SPSS version 25.0. Baseline characteristics of the groups were compared using one-way ANOVA for continuous variables and chi-square tests for categorical variables. The primary and secondary outcomes were analyzed using repeated-measures ANOVA to assess the effects of time, group, and their interaction. Post-hoc pairwise comparisons with Bonferroni correction were conducted to identify significant differences between groups. Effect sizes were calculated using Cohen's  $d$ .

## Findings

**Participant Flow and Baseline Characteristics:** Out of the 150 participants initially enrolled, 135 completed the study (45 in each group). The dropout rate was 10% (15 participants), with dropouts evenly distributed across the three groups. Table 1 presents the baseline characteristics of the participants, showing no significant differences between groups.

Characteristic	Spinal Manipulation (n=45)	Mobilization (n=45)	Massage Therapy (n=45)	p-value
Age (years)	42.3 ±10.2	41.8 ±11.3	43.1 ±9.9	0.83
Gender (M/F)	22/23	20/25	21/24	0.90
Pain Duration (months)	14.5 ±5.7	15.2 ±6.1	14.8 ±5.9	0.76
Baseline VAS score	7.2 ±1.1	7.3 ±1.2	7.1 ±1.0	0.65

Baseline ODI score (%)	45.6 ±8.7	46.2 ±9.1	45.9 ±8.3	0.88
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### Primary Outcomes

**Pain Relief (VAS Scores):** All three intervention groups showed significant reductions in VAS scores from baseline to immediately post-treatment and at 3-month follow-up ( $p < 0.001$ ). The spinal manipulation group demonstrated significantly greater pain relief compared to the mobilization and massage therapy groups immediately post-treatment ( $p = 0.03$ ) and at 3-month follow-up ( $p = 0.02$ ).

Time Point	Spinal Manipulation	Mobilization	Massage Therapy	p-value
Baseline	7.2 ±1.1	7.3 ±1.2	7.1 ±1.0	0.65
Immediately Post-Treatment	3.8 ±1.0	4.5 ±1.1	4.6 ±1.2	0.03
3-Month Follow-Up	4.1 ±1.1	4.8 ±1.2	4.9 ±1.3	0.02

**Functional Improvement (ODI Scores):** All groups exhibited significant improvements in ODI scores from baseline to immediately post-treatment and at 3-month follow-up ( $p < 0.001$ ). The mobilization group had significantly greater improvements in ODI scores compared to the spinal manipulation and massage therapy groups immediately post-treatment ( $p = 0.04$ ) and at 3-month follow-up ( $p = 0.03$ ).

Time Point	Spinal Manipulation	Mobilization	Massage Therapy	p-value
Baseline	45.6 ±8.7	46.2 ±9.1	45.9 ±8.3	0.88
Immediately Post-Treatment	28.3 ±7.5	25.7 ±6.8	29.1 ±7.6	0.04
3-Month Follow-Up	29.4 ±7.7	26.1 ±6.9	30.0 ±7.8	0.03

### Secondary Outcomes

**Quality of Life (SF-36 Scores):** All groups reported significant improvements in SF-36 scores across all domains from baseline to immediately post-treatment and at 3-month follow-up ( $p < 0.001$ ). There were no significant differences between the groups in any of the SF-36 domains.

Domain	Spinal Manipulation	Mobilization	Massage Therapy	p-value
Physical Functioning	55.1 ±10.3	56.2 ±9.8	55.9 ±10.0	0.72
Bodily Pain	48.3 ±11.2	49.1 ±10.5	48.8 ±10.7	0.81
General Health	60.5 ±9.9	61.0 ±10.1	60.7 ±9.8	0.85
Vitality	52.4 ±8.7	53.1 ±8.5	52.8 ±8.6	0.79
Social Functioning	70.3 ±10.1	71.0 ±9.9	70.8 ±10.0	0.87
Role Physical	55.8 ±9.4	56.5 ±9.2	56.2 ±9.3	0.90
Role Emotional	63.4 ±8.3	64.1 ±8.1	63.8 ±8.2	0.84
Mental Health	66.2 ±7.9	67.0 ±7.7	66.7 ±7.8	0.78

### Patient Satisfaction

High levels of satisfaction were reported in all groups, with no significant differences between the groups.

Group	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied	p-value
Spinal Manipulation	28	12	4	1	0	0.76
Mobilization	30	10	3	2	0	0.68
Massage Therapy	27	13	4	1	0	0.81

## Discussion

**Summary of Findings:** This study aimed to compare the effectiveness of different manual therapy techniques—spinal manipulation, mobilization, and massage therapy—on pain relief and functional improvement in patients with chronic lower back pain (CLBP). The results demonstrated that all three interventions significantly reduced pain and improved function. Spinal manipulation provided the most significant pain relief, while mobilization led to the greatest improvements in functional outcomes. Quality of life enhancements and patient satisfaction levels were similar across all treatment groups.

**Interpretation of Results:** The superior pain relief observed with spinal manipulation is consistent with previous studies that highlight its efficacy in addressing acute and chronic low back pain (Rubinstein et al., 2012; Assendelft et al. (2003). The rapid pain reduction could be attributed to the mechanical adjustment of spinal structures, resulting in decreased nociceptive input and muscle tension (Licciardone et al., 2003).

Mobilization showed the greatest improvement in functional outcomes, aligning with findings that suggest its effectiveness in enhancing mobility and reducing disability in CLBP patients (Kuczynski et al., 2012). The rhythmic, repetitive nature of mobilization techniques may promote joint mobility and muscle relaxation, contributing to better functional performance.

Massage therapy, while less effective than spinal manipulation and mobilization in terms of pain relief and functional improvement, still demonstrated significant benefits. Massage is known to enhance blood flow, reduce muscle tension, and promote relaxation, which can indirectly contribute to pain reduction and improved function (Moraska et al., 2010).

**Quality of Life and Patient Satisfaction:** Improvements in quality of life, as measured by the SF-36 scores, were significant across all groups, with no notable differences between them. This suggests that regardless of the manual therapy technique, patients experienced enhanced physical and mental well-being. High levels of patient satisfaction were reported across all groups, indicating that all three interventions were well-received and deemed beneficial by the participants.

**Clinical Implications:** These findings suggest that each manual therapy technique offers unique advantages, and the choice of therapy should be tailored to individual patient needs and clinical objectives. For instance, spinal manipulation might be more suitable for patients seeking rapid pain relief, while mobilization could be prioritized for those aiming to improve functional capacity. Massage therapy remains a valuable option for its overall health benefits and patient comfort.

**Limitations:** Several limitations should be considered when interpreting the results of this study. The study population was limited to patients with CLBP, and the findings may not be generalizable to those with acute low back pain or other types of musculoskeletal conditions. Additionally, the study's follow-up period was relatively short (3 months), and long-term outcomes were not assessed. Future research should explore the long-term efficacy of these manual therapy techniques and their effects on different patient populations.

## Conclusion

In conclusion, spinal manipulation, mobilization, and massage therapy are all effective in managing chronic lower back pain, with each technique offering distinct benefits. Spinal manipulation is most effective for pain relief, mobilization excels in improving function, and massage therapy contributes to overall well-being. These findings underscore the importance of individualized treatment plans and highlight the value of manual therapy in the multidisciplinary management of CLBP.

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