

## EFFECTIVENESS OF MOTOR CONTROL EXERCISES AND MANUAL THERAPY FOR CHRONIC NON-SPECIFIC LOW BACK PAIN; A NARRATIVE REVIEW

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### Abstract

The chronic non-specific low back pain (CNSLBP), the most common type of chronic pain is characterized by pain between the costal margin and gluteal folds, with or without leg pain, that lasts more than three months and has no obvious pathoanatomical explanation. Since there is no conclusive anatomical explanation for about 85% of cases of low back pain, conservative, non-pharmacological therapies are the mainstay of treatment. Although manual therapy (MT) and motor control exercise (MCE) are commonly suggested first-line treatments for CNSLBP, further more researches is needed to fully understand their mechanisms of action and wider clinical effects. This narrative review's goal was to investigate and gather the most recent data on the efficacy of manual therapy and motor control exercises in the treatment of persistent, non-specific low back pain. To find peer-reviewed English-language research published between January 2020 and December 2025, a thorough literature search was carried out using Google Scholar and PubMed. Included were studies that focused on manual therapy and/or motor control training for those with low back pain. Meta-analysis was not used in the qualitative synthesis of the data. With relatively modest and temporary side effects, manual treatment was shown to be equivalent to other conservative approaches in terms of increasing function and reducing discomfort. Additionally, there is evidence in favour of combining manual treatment, MCE, and patient education to maximize results. In summary, manual therapy and motor control exercises are both safe, efficacious, and supported treatments for CNSLBP. In modern rehabilitation treatment, multidisciplinary approaches incorporating various modalities have to be given priority since they may offer improved clinical advantages. The results show that by improving deep trunk muscle activation and spinal stability, motor control exercises greatly reduce pain and disability and improve functional outcomes. When compared to traditional strength and flexibility exercises, person-specific motor skill training showed better short- and long-term functional benefits.

## INTRODUCTION

Low back pain, which is typified by pain or discomfort between the gluteal folds and the costal margin, with or without referred pain in the legs, is the most common type of chronic pain. According to estimates, 85% of cases of low back pain have no discernible pathoanatomical explanation, and the imaging techniques that are currently available do not show any conclusive proof of a reason. Such low back pain is referred to be chronic non-specific low back pain (NCLBP) when it persists for more than three months.<sup>1</sup> For NCLBP, motor control exercise (MCE) is a popular nonpharmacological intervention that is highly advised. In order to increase the activation of the deep trunk muscles that support and govern the spine, restore optimal spine control, and satisfy the functional demands of the trunk, MCE mainly employs a motor learning method. Because NCLBP is multifaceted, multidisciplinary approaches such a mix of cognitive therapy and exercise are recommended for its care. Patients with NCLBP get less pain and disability thanks to MCE. The use and optimization of multidisciplinary approaches that combine MCE with other first-line treatments are hampered by the lack of clarity surrounding the brain mechanisms behind the effects of MCE on NCLBP. It is necessary to look into the brain mechanisms that underlie MCE's impact on NCLBP patients.<sup>2</sup>

Clinical methods that are often used and have been thoroughly researched for pain intensity include general strength and conditioning and motor control exercises with adjunct spinal manipulative therapy. Less is known, though, about the potential effects of these therapies on other CLBP outcomes. There may be more advantages to these therapies that should be investigated, as this could help with clinical justification and enhance therapeutic efficacy.<sup>3</sup>

Manual therapy (MT) includes manipulating and mobilizing the spine with the hands. Guidelines support both approaches as stand-alone therapies because they are comparable. Both mobilization and manipulation appear to be safe strategies, according to research. Because MT uses non-pharmacological therapies for LBP, it is

recommended in evidence-based clinical practice and other guidelines. There is a evidence that manual therapy is just as effective at reducing back pain and promoting recovery as other treatments (exercise, traditional medical care, or physiotherapy), according to a systematic review of the literature. There is enough data, according to one systematic review, to support MT's efficacy in treating LBP. According to a different comprehensive study, MT is frequently used to alleviate back pain.<sup>4</sup>

## Methodology

The purpose of this narrative study was to examine and compile current data regarding the effectiveness of manual therapy and motor control exercises for persistent back pain. To find pertinent papers published between January 2020 and December 2025, a thorough literature search was carried out. Google Scholar and PubMed were the databases utilized. The search strategy included combinations of keywords such as "motor control exercises," "manual therapy," "chronic," and "non-specific low back pain,". (AND, OR, NOT) were also for refinement of the search.

A total of studies was included in this review based on the following inclusion criteria:

- Published between 2020 and 2025
- Only Peer-reviewed articles
- Studies involving human subjects who are suffering from chronic back pain
- Articles focusing on the application or outcomes of manual therapy and/or motor control training

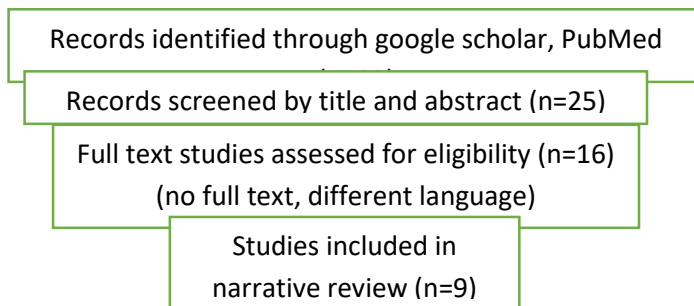
## Exclusion criteria were

- Non-peer-reviewed articles
- Articles focusing on other unrelated rehabilitation methods or other treatment options.

The chosen studies underwent an independent evaluation for relevance, utilizing topics and study abstracts, succeeded by a comprehensive full-text review. A qualitative synthesis of the literature was carried out without statistical meta-analysis because this is a narrative review. The

results were grouped thematically under the functions of motor control training and manual treatment, as well as their combined impact on chronic low back pain.

### Flow diagram for methodology



### Rehabilitation management

The current analysis's goal was to produce high-quality evidence in favor of the theory that individuals with non-specific low back pain benefit from motor stabilization exercises (MCE) by experiencing less pain and disability. The study shows that person-specific MST improves function more than typical strength and flexibility exercises in both short-term and long-term LBP-limited functional tasks.<sup>5</sup>

In order to increase spinal stability, motor-control exercise focuses on strengthening the extensor muscles of the trunk.<sup>6</sup>


One of study findings demonstrated that, in the short term, PE and MCE outperformed PE alone MCE alone outperformed PE alone in terms of disability; and PE alone outperformed PE plus MCE in terms of pain catastrophizing and back consequences belief. All intervention modalities were linked to improvements in pain and disability, but MCE produced larger short-term gains than PE alone. In order to encourage self-management and lessen the effect in low-resource rural communities, this experiment offers more evidence in favor of combining PE with MCE, as advised by current guidelines.<sup>7</sup>

Recent guidelines oppose pharmacological treatment as a first step in the biomedical care of NSLBP.

In comparison to no treatment, manual therapy did not generally yield statistically significant differences in adults suffering from chronic or persistent non-cancer back and neck pain; nevertheless, there was some evidence indicating that manual therapy treatment led to improvements in pain, functional status, and health-related quality of life. Although manual therapies are typically well tolerated, they, along with their comparators (no treatment), were linked to minimal, temporary side effects such as pain and fatigue.<sup>8,9</sup>

Table 1 shows the summary of the articles selected

Study design	Sample size and patient population	Intervention	Key findings	Conclusion
Randomized Controlled Trial	154 people were included in study with chronic low back pain	Six weekly sessions of one-hour MST in functional activity performance or SFE of the lower limbs and trunk were given to the participants. Six months after treatment, up to three booster treatments were administered to half of the individuals in each group.	Compared to strength and flexibility exercises, motor skill training produced a noticeably larger and longer-lasting functional gain.	When it comes to improving function in people with persistent low back pain, person-specific motor skill training works better than traditional exercise regimens.
Prospective, Observational Study	The study comprised fifteen individuals with low back pain who could perform motor training at home for 6 months, had been symptomatic for at least three months, and had no evident organic disease.	The intervention exercises included deep muscle strengthening, "bridge" for extension, and "cat-dog" for trunk flexion. They were instructed to exercise 2 times every week for 20 min a day for half year.	After six months of exercise, functional outcomes and pain intensity significantly improved; muscle mass and spinal alignment did not significantly change.	Patients with persistent pain, benefit from home-based self-motor-control training in terms of pain and motor function; however, muscle mass and alignment are not significantly affected.

Single-blind, randomized clinical trial	120 adult rural residents with CLBP were divided into three groups	Stretching, Motor control training, and aerobic trainings were administered to participants in the PE plus MCE group after PE. While individuals in the MCE group received stretching followed by MCE and aerobic exercises, those in the PE alone group received PE followed by stretching and aerobic exercise.	When compared to PE alone, PE + MCE demonstrated noticeably higher reductions in pain intensity and impairment. When compared to PE alone, MCE shown a greater improvements in impairment.	For rural individuals with chronic low back pain, motor control exercise and educating the patient reduces pain and impairment more effectively than either intervention alone.
Prospective study	1911 patients from 17 RCTs were included. A meta-analysis comprising 338 patients from 8 RCTs		Individuals with persistent, low back pain (more than 12 weeks)	Patients can effectively reduce pain and improve quality function with exercise-based rehabilitation.

Prospective study			Individuals with persistent, non-specific low back pain (symptoms lasting more than three months)	Patients with chronic low back pain can effectively reduce pain and improve function with exercise-based rehabilitation.
Systematic literature review and meta-analysis.	This study analyzed data from multiple studies, including 47 randomized trials with over 4,460 patients suffering from chronic neck pain.	In combination with exercise therapy, they have used manual therapy techniques such as manipulation and mobilizations	This study finds out that rather than use manual therapy or exercise therapy alone it is much better to use both a time for best outcome. Manual therapy helps to improve ROM and alleviate symptoms.	By combining manual therapy with exercise therapy healthcare professionals will be now able to improve patient symptoms as manual therapy is a viable option for treating patients with chronic low back and neck pain.

		in their study as treatment option.		
Randomized controlled trial	Patients with nonspecific chronic low back pain and disability.	They have used supervised exercise with home exercise and manual therapy.	In order to treat patients with nonspecific chronic back pain, both of the interventions showed significant results in improving pain, function and better quality of life.	This research highlights the potential benefits of both home exercise with manual therapy and supervised exercise for individuals with nonspecific chronic low back pain, providing healthcare professionals with evidence-based treatment.
Randomized controlled trial	60 participants with chronic non-specific low back pain were randomly allocated to either.	They have used motor control exercises with self-administered stretching techniques.	In this study both of the self-administered and motor control helpful in reducing pain and alleviating symptoms.	This study provides evidence that both general strength and conditioning and motor control with manual therapy can be effective treatment options for chronic low back pain, offering clinicians a range of options for patient care.
Randomized controlled trial	Patients with non-specific chronic low back pain	Motor control exercise - Possibly a control group or comparison intervention	The study likely investigated changes in functional connectivity in the brain associated with motor control exercise in patients with non-specific chronic low back pain	The study's findings suggest that motor control exercise can modify brain function and potentially contribute to pain reduction and improved function in patients with non-specific chronic low back pain.
Systematic Review and Meta-Analysis	29 trials (n = 2471 participants)		Motor control exercises (MCE) had a significant impact on reducing pain and improving function, with moderate effect sizes.	Motor control training for the lumbar region is a proven treatment for chronic lower back pain without a specific cause, leading to notable reductions in pain and improvements in functional ability.

### Conclusion

Effective non-pharmacological management techniques are necessary for the very common condition of chronic non-specific low back pain. The use of manual therapy and motor control exercises to reduce pain, improve function, and lessen impairment in people with CNSLBP is supported by current research. When compared to traditional exercise regimens, motor control exercises—especially person-specific approaches—show improved short- and long-term functional effects. The results of manual therapy are comparable to those of other conservative treatments, making it a safe and successful intervention. According to current evidence-based guidelines, a multidisciplinary rehabilitation approach that incorporates manual treatment, motor control training, and patient education seems to maximize clinical outcomes.

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