THE EFFECT OF LUMBAR MOBILIZATION ON LOW BACK PAIN PATIENTS

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Contents

I. Introduction	2
II. Literature Review	5
III. Methodology	8
VI. Results:	10
IV. Discussion	15
V. Conclusion	18
VI. References:	19

I. Introduction

Musculoskeletal disorder—low back pain (LBP)—is one of the most common health problems among populations of all different ages worldwide. Up to 80% will suffer LBP at some time during their life, so it is a huge public health problem. (Hoy et al., 2014). Apart from being the leading cause of disability worldwide, LBP also places a considerable economic burden in terms of healthcare costs, work loss, and associated long-term disability (Dagenais et al., 2008).

LBP is a complicated medical problem that can be caused by different reasons, including mechanical issues in your lumbar spine, degenerative disease, poor posture, and sprain of the limb muscles. Depending on the duration of symptoms, it can be divided into acute, subacute and chronic forms. LBP that lasts for 12 weeks or less is considered acute and, for most people, will clear up in a few weeks; for many people, the pain will become chronic (lasting more than 12 weeks). Chronic LBP is especially difficult to treat because there is usually a combination of physical and psychological components contributing to decreased quality of life and long-term functional limitations (Balagué et al., 2012).

The effect of LBP on daily function is marked. LBP patients have restricted mobility and are not able to do routine tasks, and activities involving physical activity are affected. These limitations can, over time, reduce one's work capacity and social participation and further complicate the effects of the condition. Apart from the personal impact of LBP, the economic burden of the disease is also tremendous, given healthcare utilization, direct costs and indirect costs of lost work days and productivity. In the US alone, LBP is thought to cost between \$100 to \$200 billion per year, with the vast majority of that burden due to chronic cases (Dagenais et al., 2008).

A manual therapy technique known as lumbar mobilization is a passive movement of the spinal joints in certain directions to restore mobility to the joints and reduce pain. Specific mobilisation has been identified as addressing mechanical dysfunction, particularly of the lumbar spine, which is identified as a common cause of LBP. Lumbar mobilization is intended to enhance the biomechanical function of the lumbar spine, relieve discomfort, and restore normal movement patterns (Goodsell et al., 2000). Physical therapists and chiropractors widely use it as part of a more complete rehabilitation program for LBP patients.

A number of studies have observed that lumbar mobilization significantly decreases pain and function. However, the evidence is mixed, with some studies showing no or only minimal long-term benefit. This disparity of findings implies that lumbar mobilization may be useful in some LBP subgroups, but more research is required to select which patients benefit most and which mobilisation methods are optimal.

Although lumbar mobilization is used extensively for treating LBP, there is no agreement within the scientific community regarding its effectiveness. The short- and long-term benefits of lumbar mobilisation are reported in current literature to be both beneficial with significant improvements in pain and function or not with little or no effects observed (Satpute et al., 2019). This difference informs of a lack of knowledge, and a systematic review that marshals and critically appraises the evidence is required. There is also little understanding of how exactly lumbar mobilization reduces pain, which contributes to research needs.

Thus, the objective of this systematic review was to provide evidence extending from previous clinical trials in synthesising clinical evidence on the effectiveness of lumbar mobilisation in managing low back pain (LBP). This review aims to specifically examine the effect of lumbar mobilisation on LBP-related pain intensity, range of motion (ROM) and functional disability in LBP individuals. A further purpose of the review is to compare alternative lumbar

mobilisation techniques and consider their associated mechanisms for reducing LBP. The purpose of this information is to increase our understanding of the role that lumbar mobilization has in the treatment of LBP and to help identify where the gaps may be in the current literature and where further research is needed.

This systematic review aims to address the following objectives:

- To assess the effects of lumbar mobilisation on pain intensity, ROM, and lumbar functional disability.
- To see which lumbar mobilisation technique is most effective in treating LBP.

We developed the basic science research question to explore the underlying mechanisms by which lumbar mobilisation may alleviate pain and improve function.

The focus of this thesis is to argue, based on the findings of this thesis, that lumbar mobilization, if performed correctly, has the potential to be an effective intervention for the management of low back pain by decreasing pain, increasing range of motion, and decreasing functional disability. While there is a need for further research identifying which techniques to use and the long-term benefits, there is some evidence in favour of their effectiveness. The results of this systematic review will serve to fill existing gaps in knowledge and to recommend directions for future research and clinical practice.

II. Literature Review

LBP is one of the most common health complaints which plague a significant part of the population in the working-age group. It is a major health problem, one of the most frequent reasons to consult a doctor, and a leading cause of disability globally (Hoy et al., 2014). LBP is further divided into three categories depending on the time frame of the condition, namely, acute, sub-acute and chronic. Chronic low back pain, which is pain that persists for more than 12 weeks, is especially difficult to treat, and outcomes include reduced movement, decreased ability to participate in daily activities and increased vulnerability to depression and anxiety (Balagué et al., 2012).

LBP can be managed with non-pharmacological or pharmacological approaches. Management by pharmacological means involves the administration of NSAIDs, muscle relaxants and occasionally opioids. However, they have some drawbacks when used in the long course; these include stomach issues and the development of dependence, especially opioids (Qaseem et al., 2017). Some of the interventions that should be used include physical therapy, exercises and manual therapy, especially for cases of CLBP, as suggested by Chou et al. (2016). From the current knowledge, LBP has many treatment modalities, but many patients with this condition either do not obtain sufficient benefits or gain only short-term relief.

Lumbar mobilisation is a method of manual therapy that involves the manipulation of the lumbar spine to increase the range of motion, reduce pain, and improve the overall function of the affected region of the spine (Goodsell et al., 2000). It is done by a person known as the physical therapist and the treatment plan may be adjusted according to the patient's requirements. The technique is based on the biomechanical theory that joint dysfunction in the spine in a cause of pain and impairment and that mobilisation would help to restore normal joint movement (Paatelma et al. , 2008). Nevertheless, the precise pathways through which

lumbar mobilization confers its benefits are still not fully understood, and it may also be that some of these benefits are mediated through neurophysiological changes in the modulation of pain through central and peripheral pathways (Bialosky et al., 2009).

Research on lumbar mobilisation has thus yielded inconclusive findings, with some revealing positive impacts on patients while others show little or no improvement. For instance, Satpute et al. (2019) conducted a study on spinal mobilisation with leg movement, and they realized that it helped in the reduction of leg and back pain in patients with lumbar radiculopathy and also improved the functional outcome and the effects were seen up to six months (Satpute et al., 2019). In the same manner, Shum et al. (2013) showed that posteroanterior lumbar mobilization helped decrease pain and lumbar stiffness, especially in patients with mechanical low back pain (Shum et al., 2013). The current study indicates that lumbar mobilization may be especially helpful for patients who have mechanical dysfunctions of the spine.

However, Konstantinou et al. (2007) established that even though lumbar mobilisation enhanced the ROM, it had no significant effect on pain reduction than the placebo treatment (Konstantinou et al., 2007). This means that the effectiveness of lumbar mobilization could be influenced by certain parameters of the patient and his/her lower back pain.

In addition, a narrative literature review by Chambers (2013) concluded that although lumbar facet joint injections in combination with mobilization can provide short-term pain relief, there is, however, little evidence for their efficacy in the long term (Chambers, 2013). This lends support to the need for more sound and protracted investigations to determine the effectiveness of lumbar mobilisation in the management of LBP and the best technique to use.

Current literature provides substantial evidence for the use of lumbar mobilization; however, there are still many unanswered questions concerning the treatment. Unfortunately, many of the published papers have limited subject numbers, brief observation periods, and diverse research methods, which makes it difficult to determine their effectiveness. Also, there is uncertainty about the most effective mobilization methods and management regimens, in addition to the consequences of these interventions in the long run (Bialosky et al., 2009). Future studies should be conducted to fill these gaps, especially by using large sample sizes and high methodological quality RCTs that examine the underlying pathways, compare the efficacy of different types of mobilization and evaluate the durability of the interventions.

III. Methodology

Systematic Review Protocol Registration

Prior to the execution of this systematic review, there was no registered protocol. Registration of protocol in systematic reviews, which is usually carried out through PROSPERO (International Prospective Register of Systematic Reviews), guarantees transparency, prevents selective reporting and avoids duplicate research. The review registration outlines at the start the objectives, inclusion criteria and methodology for the review actions as a guide.

This review follows a PRISMA guideline and adopts a structured methodology to attempt to control for bias and provide a comprehensive reporting manner; however, not having a pre-registered protocol may also be viewed as a limitation. Given the protocol registration of this review, future updates or extensions of this review may benefit from the registration as a means to increase the rigour of this review and/or increase the alignment of this review to best practices in systematic review conduct.

Study Design

The purpose of this systematic review was to assess the impact of lumbar mobilization in the management of patients with low back pain. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used as a framework for the review to have a systematic and coherent approach. The protocol was not priorly registered for the review; hence, it was not available in the database.



Inclusion Criteria:

- Study Types: RCTs, clinical trials or observational studies in which data were retrieved from peer-reviewed journals.
- Participants: Adult patients with a mean age of 18 and above with lumbar pain.
- Interventions: The current literature review investigated the lumbar mobilization techniques.
- Outcomes: Pain intensity, range of motion, functional disability and patients' satisfaction.

• Language: Research articles that are based on the English language and published between the years 2000 and 2024.

Exclusion Criteria:

• Those which do not involve human participants or those that target children and adolescents.

• Non-English language publications.

The search of the literature was done in PubMed, Cochrane Library and Scopus. The search terms included "lumbar mobilization", "low back pain", and "randomized controlled trial" while using Boolean operators. Further, the search was done manually through the bibliography of the studies that were deemed relevant to the study.

Study Selection

It was a two-stage process. First, titles and abstracts were searched in order to exclude articles that were not sufficiently related to the topic. Potential studies were then screened for relevance based on their title and abstract, and full-text reviews were done to check eligibility based on the set inclusion and exclusion criteria. The review methodology was described by a PRISMA flow chart for the selection of the studies under consideration.

Data Extraction

Information from the studies was collected using a predeveloped data extraction form that provided information on the study type, participants, interventions, and results. Two authors conducted the data extraction separately, and in case of any disagreement, the two authors discussed to achieve a consensus.

VI. Results:

This systematic review was performed in order to identify the current evidence, and the findings are summarized in a table. Based on the current search criteria, ten studies were

included in the table below, which summarises the study characteristics, interventions, outcomes and findings.

Study	Participants	Study Design	Dose & Intervention	Control/ Comparison	Outcomes Measured	Main Findings
Goodsell et al. (2000)	26 adults	RCT	Posteroanterior mobilization, 3 sessions per week for 2 weeks	Control (no mobilization)	Pain intensity, lumbar flexion/exten sion ROM	The relatively high frequency and short duration of treatment (6 sessions total) led to notable pain relief but were not sufficient to improve lumbar ROM. This suggests short-term mobilization may primarily target pain mechanisms.
Hanrahan et al. (2005)	19 collegiate athletes	RCT	Grade I & II lumbar joint mobilizations, 3 sessions over 2 weeks	Control (prone position without mobilization)	Pain intensity, muscle force	The low-intensity mobilizations, despite being administered at a high frequency, achieved good pain relief and muscle activation outcomes, indicating that even lighter mobilization grades can be effective in the short term.
Konstantinou et al. (2007)	26 adults	Crossover, placebo- controlled	Flexion mobilizations with movement, 3 times per week for 2 weeks	Placebo intervention	Lumbar ROM, pain intensity	The high frequency (6 sessions total) produced marked improvements in ROM but limited effects on pain. This highlights that different mobilization techniques may target specific outcomes, with flexion-based techniques aiding mobility.
Powers et al. (2008)	30 adults	RCT	Posterior-to-anterior mobilization + press-ups, 1 session, 15-20 minutes	Press-up exercise alone	Pain intensity, lumbar extension ROM	A single session combining mobilization with exercise showed immediate benefits in terms of pain and mobility, suggesting that even a one-time application can

Study	Participants	Study Design	Dose & Intervention	Control/ Comparison	Outcomes Measured	Main Findings
					D	provide relief when combined with active movement.
Adel (2010)	60 adults	Pre-test post-test design	Neural mobilization + lumbar mobilization, 3 sessions per week for 4 weeks	SLR stretching + lumbar mobilization + exercise	Pain, functional disability, symptom centralizatio n	Neural mobilization combined with lumbar techniques, applied at a high frequency, led to substantial reductions in pain and symptom centralization, highlighting the benefit of combined approaches over longer durations.
Beattie et al. (2010)	20 adults	Prospective , repeated measures	Lumbar joint mobilization + prone press-ups, 1 session, 15-20 minutes	None	Pain intensity, diffusion of water in intervertebral disc	A one-time, high-intensity session involving both mobilization and exercises led to immediate improvements in disc hydration and pain, suggesting that short, focused treatments can produce immediate biomechanical changes.
Shum et al. (2013)	39 adults	Experiment al study	Posteroanterior mobilization, 5-10 minutes per session for 2 weeks	Healthy controls (no pain)	Pain intensity, lumbar stiffness, ROM	Significant reduction in pain intensity and lumbar stiffness post-mobilization, with stiffness restored to levels similar to asymptomatic subjects. Strong correlation between pain reduction and decreased lumbar stiffness.
Chambers (2013)	Various (review)	Narrative	Variable, typically 1-2 sessions per week over 4-6 weeks	Various physiotherap y techniques	Pain relief, functional improvement	Mobilization combined with facet joint injections over several weeks showed short-term benefits, indicating that mobilization dosage should be tailored

Study	Participants	Study Design	Dose & Intervention	Control/ Comparison	Outcomes Measured	Main Findings
						depending on the severity of the pain and adjunct therapies used.
Satpute et al. (2019)	60 adults	Double- blind RCT	Spinal mobilization with leg movement (SMWLM), 2 sessions/week for 4 weeks	Exercise and electrotherap y	Leg and back pain, disability, ROM, patient satisfaction	SMWLM group showed significantly greater improvement in leg pain, disability, and patient satisfaction at 2 weeks and 6 months compared to the control group.
Mehyar et al. (2020)	21 adults	RCT	Grade III lumbar mobilization, 2 sessions per week for 3 weeks	Placebo (light touch)	Muscle activity (EMG), pain intensity	Significant reduction in muscle activity and pain intensity post-mobilization. Improvements were noted in lumbar multifidus contraction and erector spinae activity.

This systematic review indicates that lumbar mobilization is probably useful in decreasing pain, increasing joint flexibility, and decreasing function impairment for patients with LBP. The usefulness of the intervention may be further improved when used alongside other forms of therapy or related exercises. Despite these findings, there is a need for more high-quality studies with different study designs, sample populations, and outcomes measured in order to establish the most appropriate lumbar mobilisation techniques to use for the various LBP populations.

Study	Design	Assessment Tool	Score	Quality Category
Goodsell et al. (2000)	RCT	PEDro Scale	8	High Quality
Satpute et al. (2019)	RCT	PEDro Scale	9	High Quality
Shum et al. (2013)	Observationa 1	Downs and Black Checklist	22	Good Quality
Konstantinou et al. (2007)	RCT	PEDro Scale	7	Moderate Quality
Mehyar et al. (2020)	RCT	PEDro Scale	6	Moderate Quality
Hanrahan et al. (2005)	RCT	PEDro Scale	5	Moderate Quality
Powers et al. (2008)	RCT	PEDro Scale	8	High Quality
Adel (2010)	Observationa 1	Downs and Black Checklist	18	Fair Quality
Chambers (2013)	Narrative Review	Not Applicable	-	Not Applicable
Beattie et al. (2010)	RCT	PEDro Scale	7	Moderate Quality

IV. Discussion

Mobilisation of the lumbar spine for the management of LBP was evaluated in this systematic review of the literature. From previous results, it was concluded that lumbar mobilisation has the possibility of reducing pain, enhancing flexibility and enhancing the overall function of LBP patients.

Pain Reduction

The review also supported the finding that lumbar mobilization helps in reducing pain intensity as a form of outcome measure. For example, Goodsell et al. (2000) and Satpute et al. (2019) indicated that lumbar mobilization reduced pain, and the second study mentioned that SMWLM was more effective in pain relief than exercise and electrotherapy. These results agree with the hypothesis that passive and active mobilization can help in reducing pain by mechanical and neurophysiologic methods. These could cause mechanical changes, such as taking pressure off the affected pain-sensitive structures, while neurophysiological changes could alter the pain-transmitting mechanisms at spinal and above spinal levels.

However, the heterogeneity of pain relief implies that the efficacy of lumbar mobilization may be influenced by several factors, including the type of mobilization technique used, the duration of the LBP and patient factors. For instance, the reviewed studies applied various grades and methods of mobilization, and this could be a reason for deviations of the results obtained. In addition, some research, such as Konstantinou et al. (2007), demonstrated that although mobilization helped to increase ROM, it did not have a significant effect on reducing pain than placebo, suggesting that the link between mobilization and pain may not be as straightforward as is presumed.

Range of Motion (ROM)

Increase in range of motion was also a common feature that was reported in all the studies. Similarly, Shum et al. (2013) and Konstantinou et al. (2007) showed that lumbar mobilization benefited the improvement of spinal flexibility especially among patients with limited physical motion because of pain or stiffness. This indicates that lumbar mobilization may be most helpful for mechanical LBP patients in whom the major problem is reduced range of motion rather than pain alone.

The reason for this enhanced ROM could be attributed to the decrease in joint stiffness and the normalisation of joint kinematics since lumbar stiffness was noted to have reduced in Shum et. al (2013). The further association between reduced pain and decreased stiffness is an indication that mobilization influences the mechanical features of the spine and thus improves the mobility of the spine while at the same time minimising discomfort.

Functional Disability

The most interesting findings include the decrease in functional disability after lumbar mobilization as seen in the works of Adel (2010) and Satpute and colleagues (2019). These results indicate that lumbar mobilization not only reduces the symptoms but also the patients' physical function. The increased values of functionality may be attributed to both pain relief and enhanced ROM, as the two combine to enable the patients to move with ease and without much pain.

Furthermore, lumbar mobilization, when combined with other approaches, including exercise and stretching, was found to produce further improvements in disability. This is in agreement with the proposition that manual therapy with active exercise should be considered the most complete approach to LBP management.

Although the results of this review are promising, certain limitations must be discussed. The wide variability in the type of study, the subjects, and the manner and frequency of lumbar mobilization applied makes it impossible to come up with a clear set of recommendations as to the type and frequency of lumbar mobilization. Also, most of the studies had a limited sample size in terms of the number of participants, which may reduce the transferability of the findings.

Further studies should aim toward enrolling more patients, using a standardized protocol, comparing various strategies of mobilisation, and examining the results of long-term application. It is also important to examine the mediating process more carefully in future studies to determine how lumbar mobilization affects the pain, ROM, and functional status of the patient.

V. Conclusion

Thus, this systematic review shows that lumbar mobilization has the potential for the management of LBP as it produces meaningful changes in pain, ROM, and functional disability. The review also showed that various techniques of lumbar mobilization can be useful in patients with mechanical LBP, especially when there is a reduced range of motion. Furthermore, integrating lumbar mobilization with other treatment modalities, including exercise and stretching, seems to improve the overall benefit and produce better functional change.

Despite the fact that the findings of the reviewed studies are quite promising, the differences in study methods, patient characteristics, and the methods of mobilization used cast a shadow over the need for better, more standardised research. Future work should aim at understanding which mobilisation technique is most helpful, how frequently and for how long lumbar mobilisation should be applied, and what the repercussions of lumbar mobilisation are in the case of LBP.

Therefore, it can be stated that lumbar mobilisation is a useful intervention in the treatment of LBP, especially when used in conjunction with other interventions. It has the potential of being more broadly used and evidence-based in the management of LBP and enhancing the quality of life of the patients.

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