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Research Paper Review

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Manipulation and mobilization for treating chronic low back pain: A systematic review and meta-analysis

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ABSTRACT

INTRODUCTION: *Mobilization and manipulation therapies are widely used to benefit patients with chronic low back pain. However, questions remain about their efficacy, dosing, safety, and how these approaches compare with other therapies. The present study aims to determine the efficacy, effectiveness, and safety of various mobilization and manipulation therapies for treatment of chronic low back pain.*

METHODS*: Studies were identified by searching multiple electronic databases from January 2000 to March 2017, examining reference lists, and communicating with experts. Randomized controlled trials were selected comparing manipulation or mobilization therapies with sham, no treatment, other active therapies, and multimodal therapeutic approaches. Risk of bias was assessed using Scottish Intercollegiate Guidelines Network criteria. Where possible, data were pooled using random-effects meta-analysis. Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) was applied to determine the confidence in effect estimates.*

RESULTS*: Studies comparing manipulation or mobilization with sham or no treatment were too few or too heterogeneous to allow for pooling as were studies examining relationships between dose and outcomes. Few studies assessed health-related quality of life. Twenty-six of 51 trials were multimodal studies and narratively described.*

DISCUSSION*: Fifty-one trials were included in the systematic review. Nine trials (1,176 patients) provided sufficient data and were judged similar enough to be pooled for meta-analysis. The standardized mean difference for a reduction of pain was SMD=-0.28, 95% confidence interval (CI) -0.47 to -0.09,*

p=.004; I^2=57% after treatment; within seven trials (923 patients), the reduction in disability was SMD=-0.33, 95% CI -0.63 to -0.03, p=.03; I^2=78% for manipulation or mobilization compared with other active therapies. Subgroup analyses showed that manipulation significantly reduced pain and disability, compared with other active comparators including exercise and physical therapy. Mobilization interventions, compared with other active comparators including exercise regimens, significantly reduced pain but not disability.

***CONCLUSION**: There is moderate-quality evidence that manipulation and mobilization are likely to reduce pain and improve function for patients with chronic low back pain; manipulation appears to produce a larger effect than mobilization. Both therapies appear safe. Multimodal programs may be a promising option.*

ANALYSIS

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Background Information

Spinal manipulation and mobilization for the treatment of back and neck pain have been the topic of several systematic reviews, with some suggesting that the evidence in support of the view that spinal manipulative therapy is superior to other standard treatments for chronic low back pain is sparse. On the other hand, more recent systematic reviews have reported that spinal manipulation and mobilization are 'viable' options for treating pain.

The effectiveness of spinal manipulation and mobilization may be variable in certain circumstances, such as when there are differences in subjects' duration of symptoms, in the way the intervention is administered, the comparator, as well as the types of outcomes reported. Despite this degree of variability among studies, manipulation and mobilization are still considered to be effective treatments when compared with other therapies.

The purpose of this systematic review was to unravel these differences and inconsistent findings by evaluating the research on the effectiveness of mobilization and manipulation for chronic non-specific low back pain according to:

1. different symptom durations across the spectrum of chronicity,

2. variations in treatment techniques,
3. variations in comparators, and
4. the impact on important patient-reported outcomes.

PERTINENT RESULTS

The literature search netted 7360 citations; however, neck pain studies were included as part of another review, but were later removed and not reported here. After screening for inclusion and reviewing hundreds of full text articles, a total of 64 publications on RCTs that reported on patients with chronic, non-specific low back pain were included in this systematic review:

- 25 unique studies were labeled as non-specific chronic low back pain unimodal (i.e. thrust or non-thrust) studies.

- 26 unique studies were multimodal (i.e. programs involving thrust or non-thrust) chronic low back pain studies.

Non-randomized studies were also considered in order to study safety issues and more pragmatic 'real world' implications that are sometimes lost in RCTs.

Of the 25 unimodal studies, 60% utilized thrust interventions, 28% non-thrust, and 12% a combination of both.

Prescribed exercise was the most common intervention used in combination with a thrust or non-thrust intervention in the multimodal studies. Stretches, massage, ultrasound, education, and advice therapy were also prescribed, but less frequently.

The overall risk of bias was not considered serious for either the unimodal or multimodal studies, with only 16% and 11% of studies respectively receiving low quality SIGN 50 scores.

Five of the 25 unimodal RCTs reported that no adverse events occurred during the study period, whereas two studies reported minor adverse events, e.g., worsening symptoms. One study reported that 2% of patients experienced serious adverse events, though none were determined to be treatment-related. Furthermore, the frequency of adverse events in the control groups was not significantly different from the treatment groups. No information on adverse events was reported for the remaining 17 studies.

No serious adverse events were reported for the multimodal studies, although 10 of the studies failed to report on adverse events. Mild adverse events were reported in six studies, which included temporary soreness following treatment, tiredness, and worsening of

existing complaints. However, none of the authors described how an event was determined to be adverse or how and when the data were collected.

Thrust Manipulation Compared to Mobilization:

Meta-analysis showed that there was a larger reduction in pain from thrust and/or non-thrust interventions compared to an active comparator of exercise or physical therapy, and the difference was statistically significant. Notably, thrust interventions performed better than non-thrust for pain reduction. Specifically, thrust interventions resulted in a 10.75 points larger Visual Analog Scale score reduction than comparators, whereas non-thrust interventions only resulted in a 5.0-point larger reduction.
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CLINICAL APPLICATION & CONCLUSIONS

The authors concluded that there is moderate-quality evidence in support of manipulation and mobilization in reducing pain and improving function for patients with chronic low back pain, with manipulation performing somewhat better than mobilization. Both therapies appear to be safe.

However, evidence concerning the efficacy of manipulation and mobilization compared to sham or no treatment on pain or disability is still lacking. This evidence gap is possibly related to the difficulties associated with implementing an acceptable sham manual intervention that can be successfully concealed from researchers and participants.

Clinical guidelines regarding manual therapies for chronic low back pain are somewhat different, depending on the country or region of origin. Spinal manipulation is recommended in most guidelines, whereas some do not recommend it. Why these inconsistencies exist, however, is unknown (1-3).

The authors suggested that better designed studies with more homogeneous groupings, clinically relevant patient-based outcomes, and larger clinical trials are still needed in order to inform practice decisions regarding spinal manipulation and mobilization for patients with chronic non-specific low back pain.

STUDY METHODS

This was a systematic review that built upon previous systematic reviews of spinal manipulation and mobilization for chronic low back pain published through 2000.

Multiple databases were searched using a broad search strategy that did not limit the populations involved (i.e. the words chronic and non-specific were not used) and included

practitioners from multiple professions. Furthermore, no limitations were placed on the types of controls or comparators used, the outcomes, or study designs.

To be included in the review, studies had to:

1. include a population experiencing chronic, non-specific low back pain;

2. utilize an intervention, with the involvement of a therapist, consisting of either (i) manipulation (thrust), (ii) mobilization (non-thrust), or (iii) a multimodal integrative practice including manipulation or mobilization components (multimodal program) if the observed effect could not be attributed directly to the thrust or non-thrust intervention;

3. be compared with a sham treatment, no treatment, or other active therapies, such as exercise, physiotherapy, or physical therapy;

4. be an RCT, involving adult human subjects age 18 years or older; and

5. use at least one pain outcome measuring a reduction in pain intensity or severity, such as the visual analog scale (VAS) or numeric rating scale.

The retrieved articles were independently screened for eligibility by six reviewers using the study eligibility criteria. Any disagreements about whether a study should be included were resolved through discussion and consensus, or by an internal steering committee, if necessary. Similarly, six reviewers participated in data extraction and quality assessment of the included studies; the internal steering committee resolved any disputes, if necessary.

Reviewers used the Scottish Intercollegiate Guidelines Network (SIGN 50) checklist for RCTs to assess the risk of bias. External validity (i.e. relevance of findings to people outside the study) was assessed using the External Validity Assessment Tool (EVAT).

The primary outcome measures were for pain intensity, disability, and/or health-related quality of life (HRQoL).

Studies were categorized into the following subgroups:

- chronicity duration was greater than 3 months versus greater than 12 months,
- the intervention consisted of thrust (i.e. manipulation) versus non-thrust (i.e. mobilization), and
- the intervention was compared to a sham or no-treatment versus another active intervention.

The magnitude of effect of the included studies was estimated via the Hedges' method. A negative effect size favors manipulation/mobilization over the comparison for a reduction

in pain intensity or disability, whereas an increase in HRQoL represents a positive effect size indicating a benefit in manipulation/mobilization over the comparison.

STUDY STRENGTHS/WEAKNESSES

This was a well-conducted systematic review that had several strengths, including:

- the involvement of an internal steering committee to contribute to the question development and PICO framework, as well as to provide guidance throughout the review with an external advisory committee;

- the use of a systematic, explicit and transparent methodology that evaluated the studies' internal validity (i.e. risk of bias), external and model validity (i.e. generalizability), utilized a meta-analysis according to patient reported outcomes, and a GRADE framework was applied to determine the overall quality of evidence for each critical outcome evaluated; and

- an independent methodological review team to carry out each of the technical steps involved in the review phases.

A limitation of this review was the presence of clinical heterogeneity between study groups. The heterogeneity was due to several reasons: 1) chronic pain is a multifactorial condition that can be associated with a variety of medical disorders, 2) the condition is difficult to evaluate, and 3) the nature of the pain and its underlying pathophysiology are poorly understood.

Another reason for heterogeneity was the fact that there is considerable variance in the styles, techniques and dosing/duration of manipulation and mobilization treatment.

Additional References:

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