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The McKenzie Method for Mechanical Low Back Pain: A Systematic Review of the Literature with a Meta-Analysis Approach

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Abstract: ***Background**: The McKenzie Method of Mechanical Diagnosis and Therapy (MDT) is a classification - based intervention designed to subgroup patients with low back pain (LBP) to guide targeted treatment. The effectiveness of MDT in improving pain and functional outcomes in acute and chronic LBP populations remains under investigation. **Objective**: The purpose of this review was to assess how effective the McKenzie Method (MDT) is in alleviating pain and improving functional ability in individuals with either acute (less than 12 weeks) or chronic (more than 12 weeks) low back pain (LBP). **Methods**: A comprehensive search of six electronic databases was conducted to identify randomized controlled trials (RCTs) assessing MDT in patients with LBP. Independent reviewers screened studies, extracted data, and evaluated risk of bias. Meta - analysis was performed to compare MDT with other treatment approaches using standardized mean differences (SMD) and 94% confidence intervals (CI). **Results**: Out of 17 studies that fulfilled inclusion criteria, 11 provided data suitable for meta - analysis. In patients with acute LBP, MDT demonstrated no statistically significant benefit over other interventions for either pain reduction (P = 0.12) or functional improvement (P = 0.61For individuals with chronic LBP, the McKenzie Method demonstrated a notable improvement in reducing disability when compared to exercise alone (SMD = –0.44). However, when compared with a combination of manual therapy and exercise, MDT showed no significant differences in outcomes related to pain or disability (P > 0.04). **Conclusion**: For acute LBP, current evidence of moderate to high quality suggests that MDT is comparable to other rehabilitative treatments in terms of reducing pain and disability. For chronic LBP, MDT appears to offer superior benefits compared to exercise alone, though not necessarily when compared to multimodal treatments such as manual therapy combined with exercise.*

Keywords: Centralization, classification, directional preference, lumbar spine, McKenzie method, confidence interval (CI), Randomized controlled trials (RCTs).

1. Introduction

Low back pain (LBP) is currently recognized as the top contributor to disability across the globe, with around 9.4% of individuals experiencing it at any given time and up to 39% affected during their lifetime. The condition not only impacts physical functioning but also adversely affects the psychosocial well - being of affected individuals. As global populations continue to age, the prevalence of LBP is expected to increase further.

In recent years, a number of clinical practice guidelines have advocated for a shift from traditional pathoanatomical treatment models towards a classification - based approach. Evidence suggests that classification of patients into subgroups can potentially improve clinical outcomes, although this remains a subject of debate due to limitations in the design and quality of several trials.

The McKenzie Method, also known as Mechanical Diagnosis and Therapy (MDT), is one of the most widely recognized systems used to classify and manage low back pain (LBP). This approach categorizes patients into three primary mechanical subgroups—derangement, dysfunction, and postural syndrome—with an additional 'other' subgroup when required. Among these, the derangement syndrome is the most prevalent and is characterized by rapid symptom changes in response to exercises based on the patient's directional preference.

Directional preference refers to the specific movement or sustained position that leads to an improvement in symptoms. A related clinical phenomenon is centralization, wherein radiating pain progressively retracts in a distal - to - proximal pattern, often considered an indicator of favourable prognosis. Studies have demonstrated that when MDT - based treatment is aligned with a patient's directional preference and centralization pattern, outcomes in terms of pain reduction and functional improvement surpass those achieved through general range - of - motion exercises.

While MDT has shown good inter - examiner reliability in patient classification, its overall treatment effectiveness remains contested. The most recent meta - analyses to date have reported only limited evidence in support of MDT, although several additional randomized controlled trials (RCTs) have subsequently emerged.

It is important to distinguish between acute (<12 weeks) and chronic (>12 weeks) forms of LBP, as these differ significantly in clinical presentation and response to interventions. Prior meta - analyses frequently failed to make this distinction, potentially confounding treatment outcomes. Furthermore, previous comparisons often grouped MDT against a range of passive treatments, which may obscure the relative effectiveness of MDT when compared against individual intervention types. Therapist expertise and level of MDT training also appear to influence treatment outcomes and should be factored into assessments of efficacy.

The objective of the present meta - analysis is to systematically evaluate the effectiveness of MDT, delivered by trained practitioners, in comparison to various active and passive interventions for improving pain and disability outcomes among patients with acute and chronic LBP, assessed separately.

2. Methods

The methodology for this review was guided by the Preferred Reporting Items for Systematic Reviews and Meta - Analyses (PRISMA) guidelines, and data extraction procedures were developed in accordance with the Cochrane Handbook for Systematic Reviews of Interventions

Eligibility Criteria

This review included randomized controlled trials (RCTs) that evaluated the effectiveness of Mechanical Diagnosis and Therapy (MDT) on outcomes related to pain and disability in patients with low back pain (LBP). There were no restrictions on the date of publication, and studies published in English or French were eligible for inclusion. The following **exclusion criteria** were applied:

- Studies containing duplicate data from other publications
- Trials where MDT was combined with other interventions in a way that prevented clear attribution of outcomes to MDT
- Studies published in non–peer - reviewed sources
- Trials in which an MDT classification was not conducted prior to initiating treatment, as this is a core element of the MDT approach

Additionally, only studies involving therapists trained in MDT were included. Therapist training was defined as participation in at least one course offered by the McKenzie Institute International, specifically focused on the application of MDT for LBP. This criterion was based on evidence indicating that trained therapists demonstrate significantly higher reliability in patient classification (κ = 0.7–0.9) compared to untrained therapists (κ = 0.17–0.39).

Sources of Evidence

Six electronic databases were systematically searched: MEDLINE, Embase, CINAHL, the Cochrane Database of Systematic Reviews, PsycINFO, and the Physiotherapy Evidence Database (PEDro). The search strategy was built around three primary concepts: (1) Mechanical Diagnosis and Therapy (MDT), (2) low back or lumbar pain, and (3) randomized controlled trials.

The initial database search was conducted on November 12, 2015. Subsequent updates were performed on May 26, 2016, and again on September 6, 2017, to ensure inclusion of the most recent publications. In addition to database searching, manual searches of the reference lists from included studies, relevant systematic reviews, and meta - analyses were also conducted. The McKenzie Institute International website (www.mckenzieinstitute. org) was reviewed for additional publications.

Inclusion Process

In cases of disagreement, the reviewers discussed the abstract to reach a consensus. If consensus was not achieved, a third reviewer (S. R.) provided the final decision. Full - text articles were then retrieved for all abstracts that met the initial screening criteria and were independently reviewed again by the same two reviewers. As with the initial screening, any unresolved disagreements regarding study inclusion were resolved through consultation with the third reviewer.

Data Collection and Management

Two independent reviewers (P. T. P. and M. C. F.) conducted data collection using a structured extraction form. Separate, customized extraction forms were designed for each of the two primary outcomes: pain and disability. The extraction templates were created in Microsoft Excel, following recommendations from the Cochrane Handbook for Systematic Reviews of Interventions, and were further refined to suit the specific objectives of this meta - analysis.

The following data were collected from each study:

1) Study characteristics — study duration, inclusion criteria, number of participants per group, and level of MDT training among therapists;
2) Intervention characteristics — type, duration, and frequency of both MDT and comparator interventions;
3) Outcome measures — pain and disability scores, outcome definitions, and timing of data collection.

Low back pain (LBP) is considered acute when symptoms last fewer than 12 weeks, and chronic when they continue beyond the 12 - week mark. LBP was categorized as acute if symptoms were present for less than 12 weeks and as chronic if symptoms persisted for more than 12 weeks.

Comparator interventions were categorized as:

- Other interventions,
- placebo, or
- subcategories of "other interventions. "

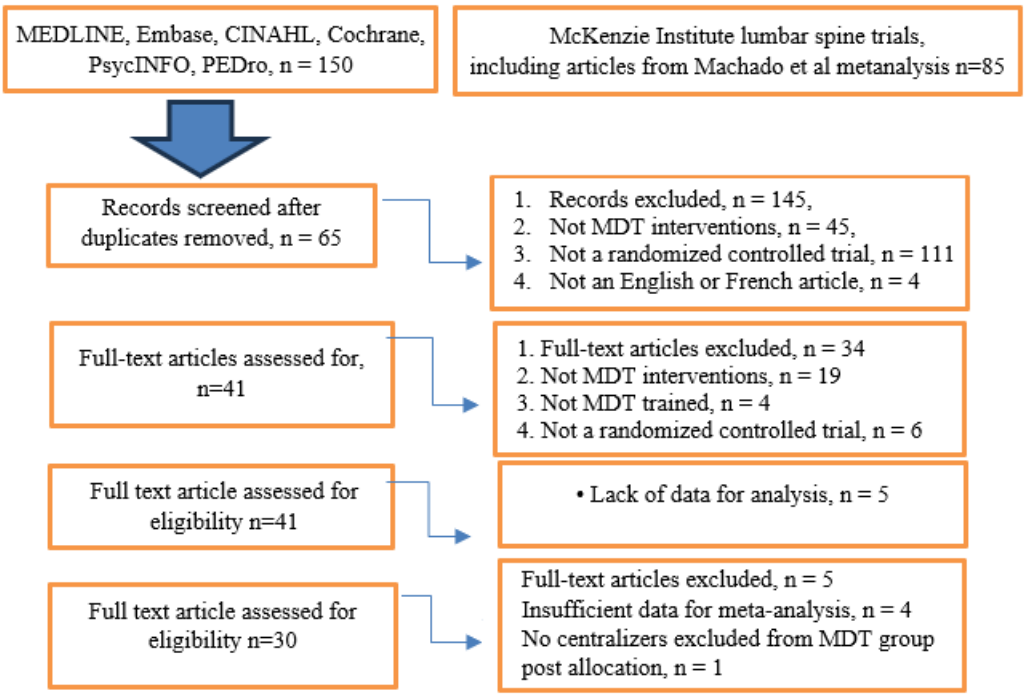
"Other interventions" were defined as nonsurgical, non - invasive treatments within the scope of physical therapy, such as exercise, manual therapy, or education—administered by physical therapists or other healthcare professionals.

3. Results

The initial literature search yielded 758 publications — 678 from electronic databases and 80 from reference lists. However, four studies did not provide sufficient data for statistical analysis. Attempts to obtain additional data from the authors of these studies were unsuccessful. Notably, three of these four studies reported no significant between - group differences in pain or disability outcomes.

One eligible study was excluded from data analysis due to post - randomization exclusion of non - centralizers from the intervention group, potentially introducing bias in favor of MDT. Since this modification occurred after allocation, the study was no longer classified as a randomized controlled trial (RCT), and its findings (which favoured MDT) should be interpreted with caution. One study with a mixed population of acute and chronic LBP was included in the chronic LBP subgroup, as the majority of participants had recurrent LBP. For one study, median and interquartile ranges were

converted to means and standard deviations according to the method described in the analysis section.



Acute LBP: Primary Analysis of MDT Versus Other Interventions

Four studies comparing Mechanical Diagnosis and Therapy (MDT) with other interventions in patients with acute low back pain (LBP) consistently showed favourable outcomes for MDT. The comparator interventions included spinal manipulative thrusts, lumbar range - of - motion exercises, joint mobilizations, and first - line care (which involved advice on activity levels, use of acetaminophen, and reassurance about prognosis). One study used two comparator groups: manipulations plus home exercises, and an education booklet.

Only three of the four studies were included in the pain analysis, as one study measured bothersome Ness of symptoms (pain, numbness, tingling), which was considered a different outcome construct. There was moderate - quality evidence of no significant difference in pain reduction between MDT and other interventions (SMD = –0.45; 95% CI: –0.99 to 0.10; P =.11), with no significant heterogeneity.

All four studies contributed to the analysis of disability outcomes. The meta - analysis revealed high - quality evidence of no significant difference in disability between MDT and other physical therapy interventions (SMD = –0.07; 95% CI: –0.34 to 0.20; P =.61), with no significant heterogeneity.

Acute LBP: Subgroup Analysis

MDT vs. Manual Therapy Plus Exercise

Three studies compared MDT with manual therapy combined with exercise. Two studies contributed data to the pain analysis. There is moderate - quality evidence indicating that Mechanical Diagnosis and Therapy (MDT) is associated with a statistically significant reduction in pain, showing a standardized mean difference (SMD) of –0.74 (95% CI: –1.45 to –0.03; P =.04), with no notable heterogeneity across studies. However, the confidence in this result was downgraded due to imprecision in the data. In terms of disability outcomes, the analysis incorporated three studies and revealed no statistically significant difference between MDT and the combination of manual therapy with exercise (SMD = –0.24; 95% CI: –0.77 to 0.28; P =.36), again with no evidence of significant heterogeneity.

MDT vs. Exercise Alone

No studies included in this review compared MDT to exercise alone in patients with acute LBP.

MDT vs. Education

Two studies compared MDT with education - only interventions in acute LBP. In one study, education was provided as part of first - line care—consisting of advice to remain active, avoid bed rest, reassurance regarding prognosis, and guidance on acetaminophen use.

After completing independent data extraction, the two reviewers compared their findings and resolved any discrepancies through discussion. To ensure consistency in the extraction process, the reviewers piloted the form on the first three included studies and compared results before proceeding with the remainder.

When necessary, data were missing, study authors were contacted via email to request additional information. Studies were excluded from analysis if required data could not be obtained. For each study, pain and disability outcomes were extracted at the time point immediately following completion of the intervention, when treatment effects were expected to be at their maximum.

Risk of Bias and Strength of Evidence

The methodological quality of the studies included in the review was evaluated using the PEDro scale, a tool that has shown adequate reliability (intraclass correlation coefficient of 0.680) and is considered valid for assessing the quality of clinical trials. When available, PEDro scores were retrieved from the PEDro database. For studies not indexed in PEDro, two reviewers (O. L. and D. S.) independently rated the articles. Disagreements were resolved through discussion or adjudication by a third reviewer (S. R.) when necessary. The overall strength of the evidence for each outcome (pain and disability) was evaluated using the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) framework. Two reviewers (D. S. and P. T. P.) conducted the assessment, and any unresolved disagreements were resolved by a third reviewer (O. L.). Evidence quality was initially rated as "high" and downgraded based on five factors:

1) Limitations in study design
2) Indirectness of evidence
3) Inconsistency of results
4) Imprecision of results
5) Risk of publication bias

Studies scoring below 5 on the PEDro scale were downgraded for design limitations. Differences in study populations, interventions, outcome measures, or comparisons contributed to downgrading for indirectness. Heterogeneous effect estimates led to downgrading for inconsistency. Studies with fewer than 400 participants were downgraded for imprecision.

4. Statistical Analysis

Analyses were conducted separately for acute and chronic LBP. The effectiveness of MDT compared with other interventions, subcategories of other interventions, or placebo was analysed using random - effects models, with statistical significance set at $P < 0.05$. The standardized mean difference (SMD) and corresponding 95% confidence intervals (CIs) were calculated for each comparison.

A random - effects model was selected in anticipation of heterogeneity across comparator interventions. Heterogeneity was evaluated using the chi - square test (significance set at $P < 0.10$) and the I^2 statistic. Analyses were performed regardless of heterogeneity levels.

All statistical analyses were completed using RevMan 5.3 (The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark).

When studies included more than one comparator group against MDT (e. g., manual therapy and education), the comparator with the greater expected treatment effect (e. g., manual therapy) was used in the primary analysis. Sensitivity analyses were performed by substituting alternate comparator groups. To prevent inflation of sample size, both comparator groups were not included simultaneously in any single analysis.

For studies reporting medians and interquartile ranges (IQRs), means were estimated by averaging the median and the first and third quartiles. Standard deviations were estimated from the IQR and study sample size following established guidelines.

5. Discussion

Available research of moderate to high quality suggests that Mechanical Diagnosis and Therapy (MDT) does not offer greater benefits than other rehabilitation methods in managing pain and disability in individuals with acute low back pain (LBP). In contrast, among patients with chronic LBP, MDT has shown better results than some other treatments in terms of pain relief and functional improvement. However, the extent of improvement was generally small to moderate, making it necessary to carefully consider whether these benefits are clinically meaningful.

Although MDT is supported by evidence as a valuable approach for both the evaluation and treatment of LBP, clinicians should avoid relying solely on MDT. Other treatment strategies have shown comparable effectiveness, and treatment decisions should be based on individual patient needs, preferences, and values to ensure the best outcomes.

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