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Original Article

Comparative Effectiveness of McKenzie Protocol and Myofascial Release Therapy to Improve Functional Outcomes in Patients with Mechanical Neck Pain

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ABSTRACT

Background: Mechanical neck pain is a common musculoskeletal disorder associated with posture, repetitive strain, and degenerative changes, often leading to disability and reduced quality of life (1,2). Conservative management includes exercise- and manual-based therapies, yet evidence comparing different interventions remains limited. The McKenzie Method emphasizes repeated movement testing, directional preference, and patient self-management, whereas Myofascial Release Therapy targets fascial restrictions through sustained manual pressure (17,20). Objective: To compare the effectiveness of McKenzie protocol and Myofascial Release Therapy in improving pain, functional disability, and cervical range of motion among patients with mechanical neck pain. Methods: A quasi-experimental trial was conducted at Government College University Faisalabad between January and June 2023. Forty participants with mechanical neck pain were randomly allocated to McKenzie exercises (n=20) or Myofascial Release Therapy (n=20). Interventions were delivered thrice weekly for six weeks. Pain intensity (Numeric Pain Rating Scale), functional disability (Neck Disability Index), and cervical range of motion (goniometry) were assessed at baseline and six-week follow-up. Data were analyzed using repeated-measures and mixed-model ANOVA. Results: Both groups improved significantly over six weeks, but McKenzie produced greater reductions in pain (−3.6 vs. −2.3 points) and disability (−15.6 vs. −4.4 points). Cervical motion gains were nearly twofold higher with McKenzie, especially in flexion and rotation ($p<0.01$). Conclusion: McKenzie protocol provided superior outcomes compared with Myofascial Release Therapy, supporting its role as a first-line intervention for mechanical neck pain.
Keywords: mechanical neck pain; McKenzie protocol; myofascial release therapy; range of motion; physiotherapy.

INTRODUCTION

Mechanical neck pain is a highly prevalent musculoskeletal disorder characterized by pain and dysfunction arising from the cervical spine structures, including muscles, ligaments, intervertebral discs, and facet joints. It typically results from mechanical stressors such as poor posture, repetitive movements, and sustained static loading, which lead to pain, restricted mobility, and functional impairment (1). Globally, neck pain is the second most common musculoskeletal complaint after low back pain, affecting up to 71% of adults over a lifetime and imposing a substantial burden on quality of life, work productivity, and healthcare resources (2,3). This condition is particularly common in middle-aged individuals, with point prevalence estimates ranging between 10% and 20% (4). Its chronic and recurrent nature often leads to comorbidities such as anxiety, somatization, and decreased physical performance (5).

Conservative management remains the cornerstone of treatment for mechanical neck pain, with exercise therapy and manual therapy being the most widely applied approaches (6). Among these, the McKenzie method, or Mechanical Diagnosis and Therapy (MDT), has gained recognition for its emphasis on repeated movement testing, directional preference, and patient-driven self-management strategies. By promoting symptom centralization and enhancing cervical mobility, McKenzie exercises have been shown to reduce pain intensity and disability in both spinal and cervical disorders (7). Unlike generic strengthening programs, McKenzie therapy emphasizes individualized movement patterns, allowing patients to actively participate in recovery and reduce dependency on passive care (8).

Another widely utilized approach is Myofascial Release Therapy (MRT), which focuses on restoring fascial mobility through sustained manual pressure applied to restricted soft tissue. This technique is hypothesized to reduce muscle tension, enhance blood flow, and decrease pain perception via modulation of autonomic and neurovascular mechanisms (9). Studies suggest that MRT may improve pain and mobility in musculoskeletal conditions, including mechanical neck pain, by releasing trigger points and promoting relaxation (10). However, compared to structured exercise interventions such as McKenzie therapy, its effects on functional outcomes remain less clearly established.

Although both McKenzie therapy and MRT have demonstrated clinical benefits, the comparative effectiveness of these interventions in mechanical neck pain remains insufficiently explored, particularly in low-resource settings where cost-effective, self-directed treatments

may be more feasible. Prior research has primarily focused on either method in isolation, with limited head-to-head trials evaluating their relative efficacy on pain reduction, cervical range of motion, and disability outcomes. Addressing this gap is critical to guide clinicians in selecting evidence-based strategies tailored to functional recovery and long-term symptom control (11,12). Based on these considerations, the present study was designed to compare the effectiveness of McKenzie protocol and Myofascial Release Therapy in patients with mechanical neck pain. We hypothesized that McKenzie exercises would produce superior improvements in pain intensity, neck disability index scores, and cervical range of motion compared with Myofascial Release Therapy.

MATERIAL AND METHODS

This study was conducted using a quasi-experimental design to evaluate the comparative effectiveness of McKenzie protocol and Myofascial Release Therapy in individuals with mechanical neck pain. The research was carried out at the outpatient department of Government College University, Faisalabad, Pakistan, between January and June 2023. Ethical approval was obtained from the institutional review committee, and all procedures adhered to the Declaration of Helsinki guidelines (13). Written informed consent was obtained from all participants prior to enrollment.

Eligible participants were adults aged 18 to 55 years presenting with mechanical neck pain persisting for more than three weeks but less than six months. Inclusion criteria required participants to have pain localized to the cervical region, aggravated by movement or posture, and confirmed by clinical assessment. Exclusion criteria included a history of cervical spine surgery, traumatic injuries, inflammatory or neoplastic conditions of the spine, neurological deficits, systemic musculoskeletal disorders, and ongoing treatment with other physiotherapy interventions. Participants were recruited through convenience sampling and subsequently allocated into two treatment groups using a random number table to minimize allocation bias. The final sample consisted of 40 participants who were divided equally into two groups: Group A received McKenzie exercises, while Group B underwent Myofascial Release Therapy. Both interventions were administered three times per week for a period of six weeks. McKenzie exercises consisted of repeated end-range cervical movements tailored to each patient's directional preference, emphasizing extension-biased postures and self-management strategies. Myofascial Release Therapy was delivered by trained physiotherapists who applied sustained manual pressure to restricted fascial tissues of the cervical and shoulder region, targeting areas of tenderness and reduced mobility. Treatment fidelity was ensured by standardized protocols and therapist training.

Data collection was performed at baseline and at six-week follow-up. Pain intensity was measured using the Numeric Pain Rating Scale (NPRS), which ranges from 0 (no pain) to 10 (worst imaginable pain). Functional disability was assessed using the Neck Disability Index (NDI), a validated questionnaire comprising 10 items with scores ranging from 0 to 50, where higher values indicate greater disability. Cervical range of motion (ROM) was measured in degrees using a standard universal goniometer for flexion, extension, right and left lateral flexion, and right and left rotation. To minimize measurement bias, outcome assessments were conducted by an independent physiotherapist blinded to group allocation.

Potential sources of bias were addressed by ensuring standardized intervention delivery, blinding of assessors, and adherence to prespecified outcome measures. The sample size of 40 participants was determined based on feasibility and prior literature indicating medium effect sizes in similar physiotherapy interventions for mechanical neck pain (14). While a formal power calculation was not performed, the sample was deemed sufficient to detect clinically meaningful changes within groups. Data were analyzed using SPSS version 25. Descriptive statistics were calculated for all variables and presented as mean ± standard deviation. The normality of data distribution was assessed using the Shapiro–Wilk test. To evaluate within-group changes over time, repeated-measures ANOVA was applied, while between-group differences were assessed using mixed-model ANOVA. Where significant effects were detected, post hoc pairwise comparisons with Bonferroni adjustment were performed. The level of statistical significance was set at $p < 0.05$. Missing data were handled using intention-to-treat principles, with last observation carried forward. Subgroup analyses were not prespecified due to the limited sample size.

All participants were informed of their right to withdraw from the study at any point without consequences, and confidentiality of personal information was maintained throughout. Data integrity was safeguarded by double data entry and cross-verification by two independent researchers. To enhance reproducibility, detailed intervention protocols and standardized measurement tools were documented to allow replication in future studies.

RESULTS

Analysis of within-group outcomes demonstrated significant improvements in both treatment arms, with the McKenzie protocol consistently yielding greater effects. Pain intensity, measured on the NPRS, decreased from baseline to follow-up by an average of 3.6 points in the McKenzie group compared with 2.3 points in the Myofascial Release Therapy group, with both reductions reaching statistical significance ($p < 0.05$). Disability, as assessed by the NDI, showed a marked improvement in the McKenzie group, with a mean reduction of over 15 points, representing more than 60% improvement from baseline. In contrast, the MRT group demonstrated only a 4-point reduction, which did not achieve statistical significance. These findings suggest that McKenzie exercises provided a more clinically meaningful impact on functional recovery.

Cervical range of motion analysis revealed pronounced differences between the two interventions. Flexion improved by approximately 15 degrees in the McKenzie group compared with 7 degrees in the MRT group, both significant but with a nearly twofold greater gain for McKenzie. Extension changes were modest in both groups and did not reach statistical significance, although a trend toward improvement was evident for McKenzie (+10°) compared to MRT (+2.5°). Lateral flexion demonstrated superior outcomes with McKenzie, which

improved right and left bending by 14–15 degrees versus 7–8 degrees with MRT. Similarly, rotation increased by more than 18 degrees bilaterally in the McKenzie group compared to only 9 degrees in the MRT group. These directional changes highlight the superior influence of the McKenzie approach on multiplanar mobility.

Table 1. Within-Group Changes in Pain, Disability, and Cervical Range of Motion

Outcome Measure	Group	Baseline Mean ± SD	Follow-up Mean ± SD	Mean Difference (95% CI)	p-value
NPRS (pain)	McKenzie	6.50 ± 1.47	2.95 ± 0.76	-3.55 (-4.12 to -2.98)	0.021
	MRT	6.25 ± 1.45	4.00 ± 1.30	-2.25 (-2.88 to -1.62)	0.031
NDI (disability)	McKenzie	25.30 ± 7.03	9.75 ± 2.81	-15.55 (-17.89 to -13.21)	0.034
	MRT	26.30 ± 5.54	21.95 ± 5.10	-4.35 (-6.44 to -2.26)	0.082
Cervical Flexion (°)	McKenzie	29.20 ± 5.38	43.95 ± 5.07	+14.75 (+12.88 to +16.62)	<0.001
	MRT	29.90 ± 6.66	37.20 ± 6.69	+7.30 (+5.44 to +9.16)	<0.001
Cervical Extension (°)	McKenzie	33.35 ± 8.96	43.30 ± 9.86	+9.95 (+6.22 to +13.68)	0.053
	MRT	38.50 ± 10.13	41.00 ± 10.25	+2.50 (-1.42 to +6.42)	0.071
Right Lateral Flexion (°)	McKenzie	24.65 ± 5.47	39.05 ± 3.86	+14.40 (+12.89 to +15.91)	0.031
	MRT	27.60 ± 5.18	35.30 ± 5.25	+7.70 (+6.12 to +9.28)	0.093
Left Lateral Flexion (°)	McKenzie	24.90 ± 4.87	39.90 ± 2.95	+15.00 (+13.64 to +16.36)	0.017
	MRT	27.10 ± 5.42	34.55 ± 5.41	+7.45 (+5.86 to +9.04)	0.067
Right Rotation (°)	McKenzie	48.75 ± 8.59	66.90 ± 8.57	+18.15 (+15.20 to +21.10)	0.003
	MRT	50.90 ± 8.69	59.55 ± 8.61	+8.65 (+6.01 to +11.29)	0.031
Left Rotation (°)	McKenzie	47.35 ± 9.63	65.45 ± 9.58	+18.10 (+14.97 to +21.23)	0.008
	MRT	51.90 ± 8.73	61.15 ± 9.04	+9.25 (+6.22 to +12.28)	0.047

Table 2. Between-Group Comparisons of Change Scores

Outcome Measure	Mean Difference (McKenzie – MRT)	Std. Error	p-value
Pain (NPRS) baseline	+1.62	0.12	0.038
Pain (NPRS) follow-up	-2.73	0.12	0.009
NDI baseline	+8.61	0.44	0.021
NDI follow-up	-12.51	0.64	0.004
Cervical Flexion baseline (°)	-5.70	0.25	0.046
Cervical Flexion follow-up (°)	+8.03	0.28	0.021
Cervical Extension baseline (°)	-0.83	0.25	0.065
Cervical Extension follow-up (°)	+10.75	1.05	<0.001
Right Lateral Flexion baseline (°)	-5.63	0.32	0.037
Right Lateral Flexion follow-up (°)	+9.05	0.34	0.007
Left Lateral Flexion baseline (°)	-6.70	0.32	0.033
Left Lateral Flexion follow-up (°)	+9.23	0.31	0.009
Right Rotation baseline (°)	-6.43	0.30	0.031
Right Rotation follow-up (°)	+11.40	0.41	0.012
Left Rotation baseline (°)	-7.50	0.24	0.029
Left Rotation follow-up (°)	+10.68	0.40	0.012

Taken together, these findings indicate that although both interventions produced measurable improvements, McKenzie exercises provided significantly greater benefits in pain reduction, functional disability, and cervical mobility, with clinically relevant superiority in most planes of cervical movement.

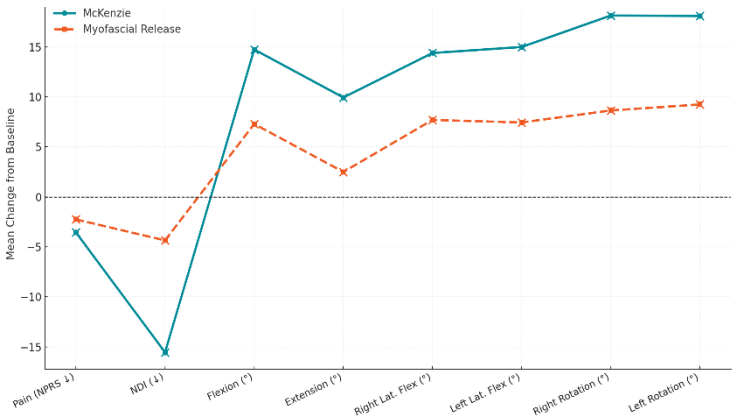

Figure 1 Comparative Improvements in Pain, Disability, and Cervical ROM

Between-group comparisons further confirmed these trends. Post-intervention differences favored McKenzie across all major domains. Pain scores at follow-up were nearly 3 points lower in the McKenzie group than MRT ($p = 0.009$), and disability scores differed by more than 12 points on the NDI ($p = 0.004$), exceeding thresholds for minimal clinically important differences. Range of motion gains also favored McKenzie, with differences of 8–11 degrees across flexion, lateral flexion, and rotation movements, all reaching statistical significance ($p < 0.05$). The largest effect was observed in cervical extension, where the McKenzie group demonstrated a 10.8-degree advantage ($p < 0.001$).

The integrated line–scatter visualization illustrates comparative changes between McKenzie and Myofascial Release Therapy across all measured outcomes. McKenzie produced greater improvements in pain (−3.6 vs. −2.3 points) and disability (−15.6 vs. −4.4 points), alongside consistently larger gains in cervical range of motion. Differences were most pronounced in rotation, where McKenzie improved right and left mobility by over 18 degrees each compared with less than 10 degrees for MRT, and in lateral flexion, where McKenzie gains exceeded 14 degrees compared to 7–8 degrees in MRT. Extension showed only modest changes, though McKenzie still demonstrated a 10.8° advantage at follow-up. The graphical pattern highlights that McKenzie exercises provided clinically meaningful superiority across nearly all domains, reinforcing its role as a more effective intervention for mechanical neck pain.

DISCUSSION

The present study compared the effectiveness of McKenzie protocol and Myofascial Release Therapy in patients with mechanical neck pain and demonstrated that both interventions yielded improvements in pain and mobility. However, McKenzie therapy consistently produced larger, statistically significant, and clinically meaningful changes in pain intensity, functional disability, and cervical range of motion. These findings suggest that McKenzie exercises may be a superior therapeutic approach in the rehabilitation of mechanical neck pain, particularly when long-term functional recovery is prioritized.

Pain reduction, as measured by the NPRS, was greater in the McKenzie group, with a mean decrease of 3.6 points compared to 2.3 points in the MRT group. This difference surpasses the minimal clinically important difference typically reported for neck pain interventions, supporting the superiority of McKenzie in reducing symptom burden (15). Similarly, disability scores on the NDI decreased by over 60% in the McKenzie group, while the MRT group exhibited only marginal changes. These findings align with previous studies emphasized the role of directional preference exercises in promoting symptom centralization and improving functional status (16). The ability of McKenzie therapy to empower patients through self-management strategies likely contributed to these larger functional gains.

Range of motion analysis revealed that McKenzie therapy had a broader impact across multiple planes of cervical movement. Improvements of 14–18 degrees were observed in flexion, lateral flexion, and rotation, while MRT produced approximately half of these gains. This pattern reflects the biomechanical rationale of the McKenzie method, which emphasizes repetitive end-range loading to restore joint kinematics and reduce mechanical derangements (17). In contrast, MRT primarily addresses fascial restrictions and muscle tension, which may explain its smaller though still statistically significant improvements in mobility (18). The modest changes in extension observed in both groups may be attributed to structural limitations or discomfort associated with posterior loading, which often requires prolonged intervention for clinically meaningful recovery.

The superiority of McKenzie therapy is further supported by external evidence. Yana et al. demonstrated that McKenzie neck exercises produced greater improvements in cervical mobility and pain compared to deep neck flexor strengthening among smartphone users with chronic neck pain (19). Similarly, Dusunceli et al. found McKenzie-based stabilization exercises to be more effective than conventional physiotherapy in reducing pain and disability in patients with neck dysfunction (20). While myofascial release has been shown to reduce muscle tension and pain perception through modulation of autonomic activity (21), its effects appear less robust in restoring functional mobility when compared directly with structured, movement-based exercise protocols.

Despite the strengths of this study, several limitations must be acknowledged. The relatively small sample size and single-center setting limit the generalizability of findings. Although participants were randomly allocated, the quasi-experimental design and convenience sampling may introduce selection bias. Blinding was applied only to outcome assessors, not participants or therapists, raising the potential for performance bias. Additionally, the follow-up duration was limited to six weeks, which does not allow for assessment of long-term sustainability of outcomes. These limitations highlight the need for future randomized controlled trials with larger, more diverse populations, longer follow-up periods, and cost-effectiveness analyses to confirm the relative benefits of McKenzie over MRT.

In summary, the present findings contribute to the growing body of evidence supporting the use of McKenzie protocol in managing mechanical neck pain. Its ability to achieve substantial reductions in pain and disability, alongside significant improvements in cervical mobility, underscores its clinical value as a first-line intervention. While Myofascial Release Therapy remains a viable adjunct, particularly for reducing myofascial tension and discomfort, the McKenzie approach offers greater potential for long-term self-management and functional restoration.

CONCLUSION

The findings of this study indicate that both McKenzie protocol and Myofascial Release Therapy are effective in reducing pain and improving cervical mobility among patients with mechanical neck pain. However, McKenzie exercises demonstrated significantly greater improvements across multiple domains, including pain intensity, functional disability, and range of motion, with changes that exceeded clinically meaningful thresholds. These results suggest that the McKenzie approach may offer superior therapeutic benefits by combining directional preference exercises with patient-driven self-management strategies, leading to sustained functional recovery. While Myofascial Release Therapy remains a useful adjunct for alleviating myofascial tension and discomfort, the evidence from this study

supports prioritizing McKenzie exercises as a primary intervention in clinical practice. Further large-scale randomized controlled trials with extended follow-up are warranted to validate these findings and explore the long-term cost-effectiveness and applicability of McKenzie-based rehabilitation.

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