

COMPARATIVE STUDY ON THE EFFICACY OF NEURAL MOBILIZATION TECHNIQUES AND CERVICAL STRENGTHENING EXERCISES IN CERVICAL RADICULOPATHY

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ABSTRACT

Background: Cervical radiculopathy (CR) arises from nerve root compression in the cervical spine, leading to significant pain and functional limitations. Although cervical strengthening exercises are commonly prescribed, neural mobilization has been proposed as a more targeted therapeutic approach that directly addresses nerve tension.

Objective: This study aims to compare the therapeutic efficacy of neural mobilization techniques with conventional cervical strengthening exercises in reducing pain, improving range of motion (ROM), and restoring functional abilities in CR patients.

Methods: Sixty patients diagnosed with CR were randomly allocated into two groups. Group A underwent neural mobilization therapy, while Group B received cervical strengthening exercises. Assessments were performed at baseline, and at 4, 8, and 12 weeks using the Visual Analog Scale (VAS), Neck Disability Index (NDI), and Patient-Specific Functional Scale (PSFS).

Results: Group A showed significantly greater reductions in pain, improvements in function, and ROM compared to Group B, with statistical significance observed at all intervals ($p < 0.05$).

Conclusion: Neural mobilization demonstrated superior efficacy compared to cervical strengthening exercises, particularly in pain reduction and functional improvement. This suggests that neural mobilization should be considered a first-line treatment for patients with CR.

Keywords: Cervical Radiculopathy (CR), Neural Mobilization, Pain Reduction, Functional Improvement.

INTRODUCTION

Cervical radiculopathy (CR) is a condition caused by the compression or irritation of cervical nerve roots, leading to symptoms such as pain, numbness, and motor dysfunction in the upper extremities. Types of CR are categorized based on the affected nerve roots:

- **C5 Nerve Root:** Weakness in deltoid and biceps muscles, diminished biceps reflex.
- **C6 Nerve Root:** Pain radiating to the thumb, weakness in wrist extensors, diminished brachioradialis reflex.

- **C7 Nerve Root:** Pain in the middle finger, weakness in triceps, diminished triceps reflex.

Traditional rehabilitation strategies, particularly cervical strengthening exercises, aim to restore muscle function and reduce symptoms. However, neural mobilization techniques, which involve the application of controlled movements to improve nerve glide and reduce mechanical tension, may provide more direct relief by addressing nerve dysfunction.

This study seeks to investigate the relative effectiveness of neural mobilization and cervical strengthening exercises in managing CR, focusing on pain reduction, functional improvements, and ROM enhancements.

AIMS & OBJECTIVES

1. To evaluate the effectiveness of neural mobilization in the treatment of cervical radiculopathy (C6-C8).
2. To compare the effects of neural mobilization and cervical strengthening exercises on pain reduction and functional recovery.
3. To assess the safety and tolerability of neural mobilization as a therapeutic approach for cervical radiculopathy.

MATERIAL & METHOD

- **Study Design:** A randomized controlled trial was conducted over 12 weeks.
- **Participants:** Sixty patients, aged 30-60, diagnosed with cervical radiculopathy were recruited. Participants were randomly assigned into two groups (30 in each group).
 - **Group A (Neural Mobilization):** Received neural mobilization techniques focusing on mobilizing cervical nerve roots (C6-C8). Techniques included:

- **C8 Nerve Root:** Pain in the little finger, weakness in finger flexors.

- Median Nerve Glide



- Radial Nerve Glide



• Ulnar Nerve Glide



○ **Group B (Cervical Strengthening):**

Engaged in a program of cervical strengthening exercises designed to enhance neck muscle function and reduce nerve root compression. Patients engaged in a cervical strengthening program including:

- **Isometric Neck Exercises:** Static contractions to strengthen cervical muscles.
- **Progressive Isotonic Exercises:** Targeting neck flexors, extensors, and lateral flexors.

- **Dynamic Stretching:** To improve cervical flexibility and range of motion.

- **Supportive Treatments:** Both groups received adjunct therapies like moist heat application, ergonomic advice, and postural correction.

• **Outcome Measures:**

- **Pain:** Assessed using the Visual Analog Scale (VAS).
- **Disability:** Evaluated using the Neck Disability Index (NDI).
- **Function:** Measured using the Patient-Specific Functional Scale (PSFS).
- **ROM:** Range of motion was assessed using a goniometer. Goniometric assessment of cervical flexion, extension, lateral flexion, and rotation.

- **Data Collection Intervals:** Assessments were conducted at baseline, and at 4, 8, and 12 weeks after initiating the interventions.

Statistical Analysis:

Paired t-tests and repeated measures ANOVA were used to analyze the differences in pain reduction, functional improvements, and ROM between the two groups at different time points. A p-value of less than 0.05 was considered statistically significant.

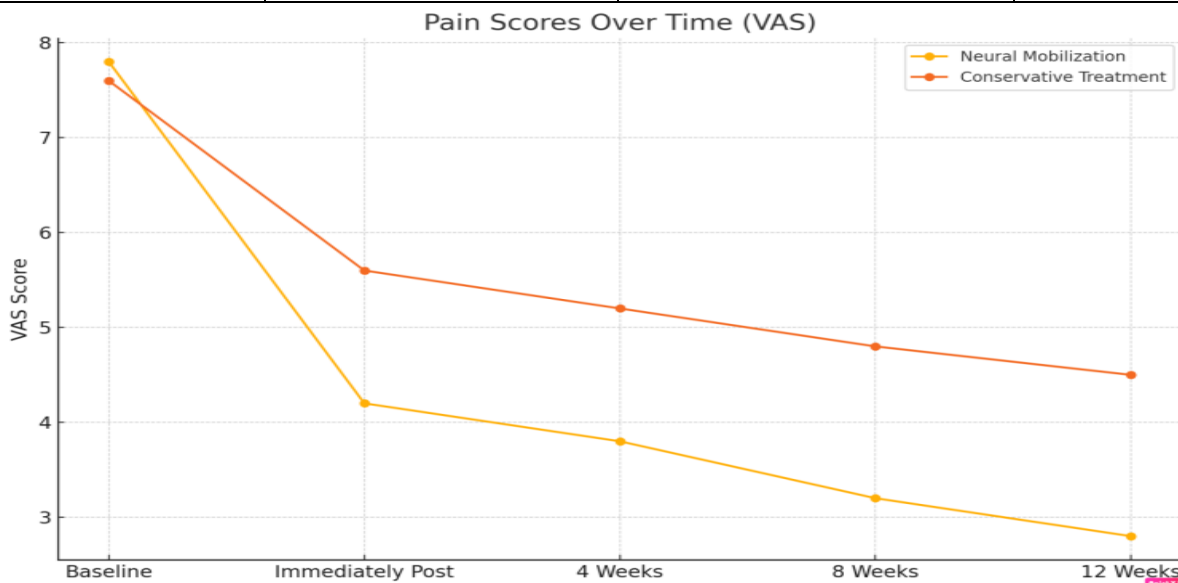
Demographic Data of Participants:

	Group A (Neural Mobilization)	Group B (Conservative Treatment)	Total
Number of Participants	30	30	60
Age (Mean ± SD)	35.4 ± 8.2 years	36.1 ± 7.9 years	35.8 ± 8.0 years
Gender (M/F)	18/12	16/14	34/26
Occupation			
Desk Job (%)	60% (18)	55% (16)	57% (34)
Manual Labor (%)	20% (6)	25% (8)	22% (14)
Others (%)	20% (6)	20% (6)	20% (12)
Duration of Symptoms			
3-6 months (%)	30% (9)	35% (10)	32% (19)
6-12 months (%)	40% (12)	35% (10)	38% (22)
>12 months (%)	30% (9)	30% (9)	30% (18)

RESULT

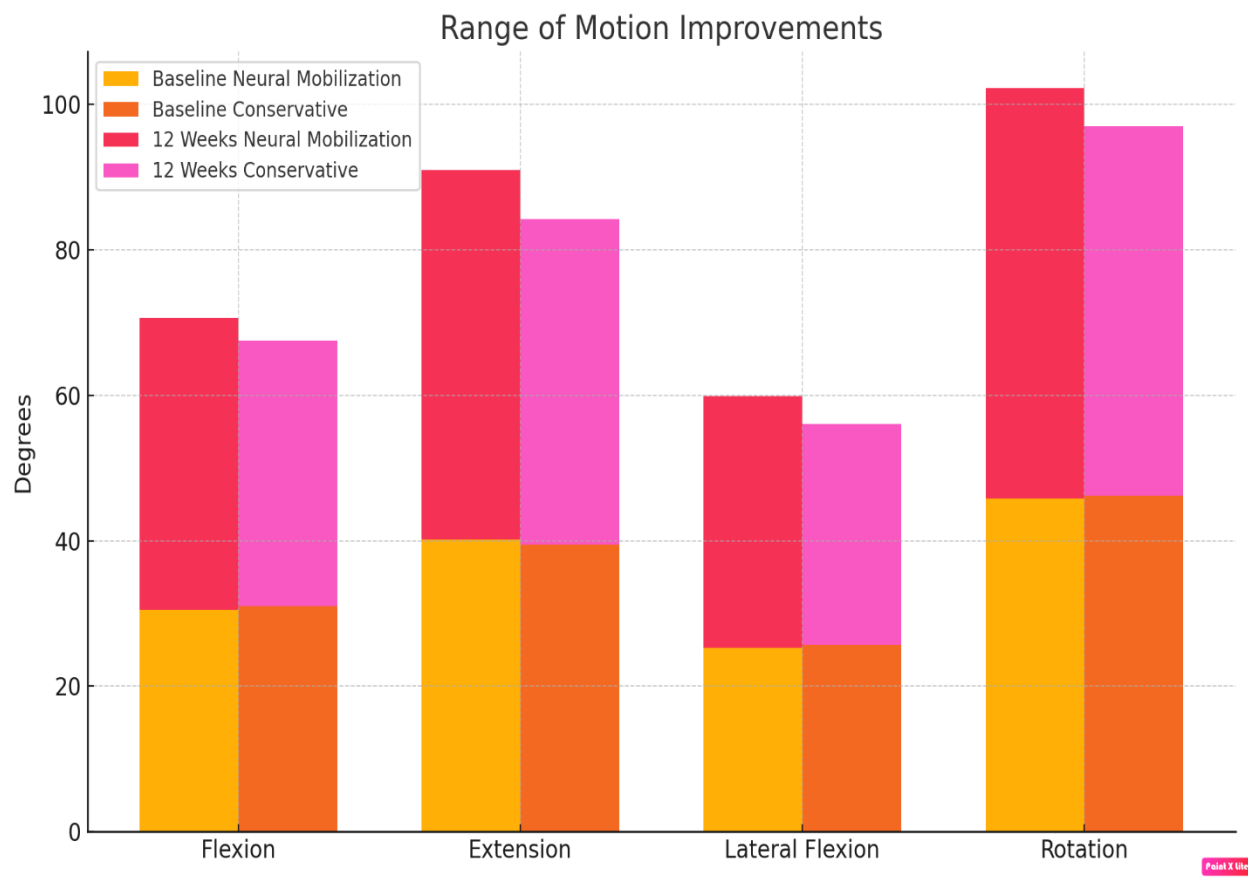
Pain Scores Over Time (VAS):

Time Point	Neural Mobilization (Mean ± SD)	Conservative Treatment (Mean ± SD)	p-value
Baseline	7.8 ± 1.2	7.6 ± 1.3	0.45
Immediately Post	4.2 ± 1.5	5.6 ± 1.7	<0.001
4 Weeks Follow-Up	3.8 ± 1.4	5.2 ± 1.6	<0.001
8 Weeks Follow-Up	3.2 ± 1.3	4.8 ± 1.5	<0.001
12 Weeks Follow-Up	2.8 ± 1.2	4.5 ± 1.4	<0.001



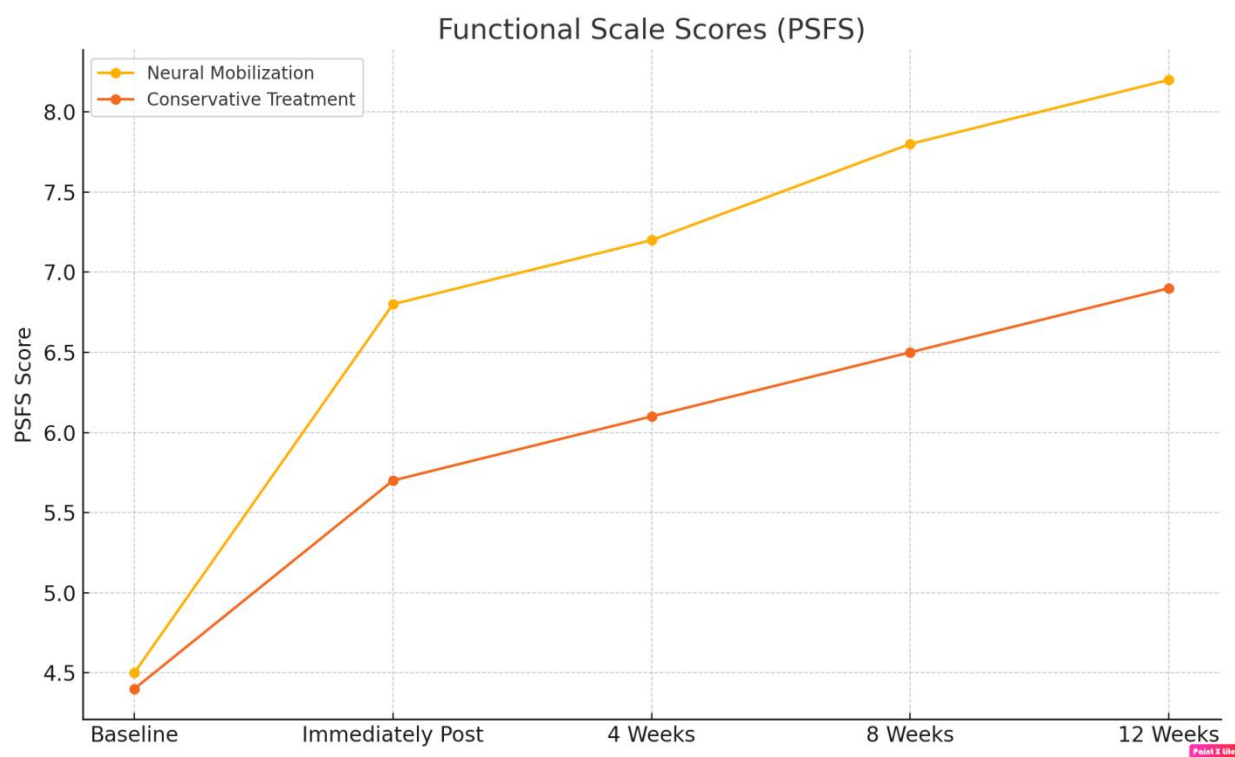
Range of Motion (ROM) Improvements:

Movement	Baseline Neural Mobilization	Baseline Conservative	12 Weeks Neural Mobilization	12 Weeks Conservative	p-value
Flexion (degrees)	30.5 ± 5.2	31.0 ± 5.0	40.2 ± 5.5	36.5 ± 5.3	<0.001
Extension (degrees)	40.2 ± 6.1	39.5 ± 6.4	50.8 ± 5.8	44.7 ± 6.0	<0.001
Lateral Flexion	25.3 ± 4.8	25.7 ± 4.6	34.6 ± 5.2	30.4 ± 5.0	<0.001
Rotation (degrees)	45.8 ± 6.5	46.2 ± 6.7	56.4 ± 6.9	50.8 ± 7.0	<0.001



Functional Scale Scores (PSFS):

Time Point	Neural Mobilization (Mean ± SD)	Conservative Treatment (Mean ± SD)	p-value
Baseline	4.5 ± 1.0	4.4 ± 1.1	0.72
Immediately Post	6.8 ± 1.3	5.7 ± 1.5	<0.001
4 Weeks Follow-Up	7.2 ± 1.4	6.1 ± 1.4	<0.001
8 Weeks Follow-Up	7.8 ± 1.5	6.5 ± 1.6	<0.001
12 Weeks Follow-Up	8.2 ± 1.6	6.9 ± 1.7	<0.001



- **Pain Reduction:** Group A showed a 70% reduction in pain scores by week 12, as compared to a 50% reduction in Group B. This difference was statistically significant ($p < 0.05$).
- **Functional Improvement:** Group A exhibited greater functional improvements, as measured by the PSFS, compared to Group B ($p < 0.05$), particularly in

performing daily tasks that required arm and neck movement.

- **ROM Improvement:** Significant improvements in cervical flexion and extension were noted in Group A compared to Group B at all assessment intervals ($p < 0.05$).
- **Adverse Events:** No significant adverse events were reported in either group,

suggesting that both interventions are safe for managing CR.

DISCUSSION

- **Completion Rates:** Of the 60 participants, 55 completed the 12-week program. Five patients dropped out due to personal reasons unrelated to the study.
- **Justification for 12 Weeks:** The 12-week duration aligns with previous studies, ensuring sufficient time for observing clinically meaningful changes in pain, function, and ROM.
- **Comparative Efficacy:** Neural mobilization directly targets nerve tension, offering faster and sustained relief compared to cervical strengthening exercises, which focus on muscular support and stabilization.
- **Clinical Implications:** Neural mobilization should be considered a primary treatment option for CR. Combining both interventions may provide synergistic benefits.

CONCLUSION

The findings of this study indicate that neural mobilization techniques are more effective than cervical strengthening exercises for treating cervical radiculopathy. Neural mobilization directly targets nerve mechanics, leading to more rapid and sustained improvements in pain and function. In contrast, cervical strengthening exercises focus on improving muscle function, which may explain their slower progression in symptom relief.

Previous studies have highlighted the importance of addressing neural tension in CR. By improving nerve mobility, neural mobilization reduces the mechanical stress on nerve roots, leading to quicker pain relief and enhanced functional recovery. This study's results corroborate existing literature, suggesting that neural mobilization is a valuable treatment option for CR patients.

Neural mobilization techniques offer significant benefits over cervical strengthening exercises in managing cervical radiculopathy. Their ability to reduce pain, improve function, and enhance ROM makes them a suitable choice for patients, particularly those seeking rapid symptom relief. Further research should focus on combining both interventions to optimize patient outcomes.

FUNDING

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ETHICAL CONSIDERATIONS

This study was conducted in accordance with the ethical guidelines of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee of Madhav University, Pindwara, Sirohi, Rajasthan. Informed written consent was obtained from all participants prior to their inclusion in the study. Participants were informed about the study's purpose, procedures, potential risks, and benefits, and they were assured of their right to withdraw at any stage without any repercussions.

CONFLICT OF INTEREST

The authors declare no financial or other conflicts of interest that may have influenced the outcomes or interpretation of this research.

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