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To Study the Effectiveness of Butler's Neural Mobilization Versus Maitland's Spinal Mobilization in Lumbar Radiculopathy

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Abstract

Background: Lumbar is a common and debilitating condition characterized by radiating pain, numbness, and functional disability due to nerve root compression or irritation. Maitland Spinal Mobilization (MSM) and Butler's Neural Mobilization (BNM) are widely used manual therapy techniques to relive symptoms due to nerve compression.. This study aimed to evaluate and compare the efficacy of MSM and BNM in managing lumbar radiculopathy.

Methods: A randomized controlled trial was conducted with 30 participants diagnosed with lumbar radiculopathy, randomly assigned to two groups: Group A (MSM) and Group B (BNM). Both groups received their respective manual therapy techniques combined with conventional physiotherapy (hot pack and ultrasound therapy) over ten sessions in two weeks. Pain intensity and functional disability were assessed pre- and post-intervention using the Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI). Statistical analysis included paired and independent t-tests, with a significance level of $p < 0.05$.

Results: Both groups showed significant reductions in NPRS and ODI scores post-intervention ($p < 0.001$). However, Group A demonstrated greater improvements in pain intensity and functional disability compared to Group B. Maitland Spinal Mobilization was more effective in reducing joint-related dysfunction, whereas Butler's Neural Mobilization was effective but less impactful in addressing the symptoms of lumbar radiculopathy.

Conclusion: This study shows that Maitland Spinal Mobilization showed superior outcomes, suggesting its prioritization in cases with lumbar radiculopathy.

Keywords: Lumbar Radiculopathy, Maitland Spinal Mobilization, Butler's Neural Mobilization, Pain Management, Functional Disability, Manual Therapy.

INTRODUCTION

Lumbar radiculopathy is a neuro-musculoskeletal disorder characterized by radiating pain, numbness, and weakness due to nerve root compression in the lumbar spine. Common causes include intervertebral disc herniation, degenerative disc disease, and spinal stenosis, leading to significant functional impairments and reduced quality of life (1,2). Conservative management, including physiotherapy and manual therapy, is widely used to alleviate symptoms. Among the manual therapy techniques, Maitland's Spinal Mobilization (MSM) and Butler's Neural Mobilization (BNM) are frequently employed to reduce pain and improve mobility (3,4).

MSM involves graded oscillatory movements targeting joint dysfunction and spinal mechanical restrictions, improving mobility and reducing pain (5). BNM, on the other hand, focuses on enhancing neural mobility by addressing adhesions and tension along the nerve pathways, which may be particularly beneficial in cases where nerve involvement is predominant (6,7). Despite the widespread use of both techniques, limited comparative evidence exists regarding their effectiveness in managing lumbar radiculopathy (8). While MSM primarily targets joint-related dysfunction, BNM aims to optimize nerve mobility, potentially offering distinct advantages based on individual patient presentations (9).

This study aims to compare the effectiveness of MSM and BNM in patients with lumbar radiculopathy through a randomized controlled trial involving 30 participants. The study evaluates pain intensity and functional disability using the Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) (10). By assessing changes in these parameters, this research seeks to provide evidence-based recommendations for selecting the most effective manual therapy approach for lumbar radiculopathy management (11,12).

NEED OF THE STUDY

The rising prevalence of lumbar radiculopathy and the variability in treatment outcomes highlight the need for research comparing MSM and BNM (8).Understanding their relative effectiveness can guide clinicians in

optimizing treatment strategies. This study aims to fill this research gap by directly comparing the two techniques to determine which provides greater pain relief and functional improvement.

AIM AND OBJECTIVE

The study aims to compare the effectiveness of MSM and BNM in reducing pain and functional disability in patients with lumbar radiculopathy. Specific objectives include:

1. Evaluating the efficacy of MSM in reducing pain and disability.
2. Assessing the effectiveness of BNM in managing symptoms .
3. Comparing both techniques to determine their relative benefits.

METHODOLOGY

HYPOTHESIS

- **Research Hypothesis:** There is a significant difference in the effectiveness of MSM and BNM in managing lumbar radiculopathy.
- **Null Hypothesis:** No significant difference exists between MSM and BNM in reducing pain and disability.

MATERIAL AND METHOD

Participants were recruited from outpatient physiotherapy clinics based on predefined inclusion and exclusion criteria.A total of 30 participants were randomly assigned into two groups.

Group A: Maitland Spinal Mobilization (MSM)

Participants in Group A received **Maitland Spinal Mobilization**, **graded passive postero-anterior oscillatory glides** to the affected level, following **conventional physiotherapy**, which included:
Hot Pack: Applied to the affected lumbar region for **10 minutes** to relax muscles and reduce stiffness.
Therapeutic Ultrasound: Administered for **5 minutes** in continuous mode (1 MHz frequency) to enhance local circulation and reduce pain.

Group B: Butler's Neural Mobilization (BNM)

Participants in Group B received **Butler's Neural Mobilization** involved controlled **sliding and tensioning movements** targeting the lumbar spinal nerves to alleviate symptoms such as pain, numbness, and tingling. Similar to Group A, participants in Group B also received **conventional physiotherapy**, which included:

- **Hot Pack**: Applied for **10 minutes**.

Therapeutic Ultrasound: Delivered for **5 minutes** in continuous mode (1 MHz frequency).
for both the group was **five sessions per week over two weeks** and each session lasted for 30-45 minutes.
Post-intervention assessments were conducted after using NPRS and ODI to measure changes in pain and disability. The collected data were systematically recorded and analyzed to compare the effectiveness of MSM and BNM in managing lumbar radiculopathy.
Outcome Measure
1. VAS Visual Analogue Scale
2. MODI modified Owestry disability index

Inclusion Criteria

1.Adults aged 40–75 years diagnosed with unilateral lumbar radiculopathy.
2.Pain intensity rated as ≥4/10 on the Numeric Pain Rating Scale (NPRS).
3.Positive findings on Straight Leg Raise (SLR) or Slump Test indicating neural tension or radiculopathy.
4.Symptoms of lumbar radiculopathy persisting for more than one month.
5.Presence of functional disability related to lower back pain as measured by the Oswestry Disability Index (ODI).
6.Willingness to participate in the study and provide informed consent.

Exclusion Criteria

1.Presence of red flag conditions such as spinal tumors, infections, or fractures.
2.History of lumbar spine surgery.
3.Diagnosed with vascular insufficiency or conditions affecting blood flow to the lower extremities.
4.Non-specific back pain conditions such as piriformis syndrome or other musculoskeletal disorders
5.Structural abnormalities such as lumbar spondylosis, subluxation, or joint hypermobility.
6.Cognitive impairments or inability to follow study protocols.
7.Pregnant or in the early postpartum period.
8.Use of pharmacological treatments or other interventions that could confound the results.

RESULTS

Table 1 presents the normality test results for the pre- and post-intervention scores of the Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI),

The demographic data presented in Table 2 compares the mean age of participants in Group A which was 58.07 years, with a standard deviation of 11.708, indicating a moderate spread of ages around the mean. In contrast, Group B had a slightly higher mean age of 60.00 years, with a lower standard
deviation of 10.036,
Table 3 presents the comparison of Numeric Pain Rating Scale (NPRS) scores between the two intervention groups: The pre-intervention scores (NPRS PRE) for both groups were identical, with a mean score of 6.60, and Post-intervention (NPRS POST) Group A had a mean post-intervention NPRS score of 2.60 (SD = 1.121, SE = 0.289), whereas Group B showed a slightly higher mean score of 3.67 (SD = 1.047, SE = 0.270). The p-value of P < 0.001 indicates a statistically significant difference in the reduction of pain levels between the groups.

Table 4 represents Pre-intervention scores for both groups were identical, with a mean ODI score of 53.00 and The p-value of 1.00.
Post-intervention,Group A (MSM) achieved a mean post-intervention ODI score of 25.33 and The p-value of P < 0.001 highlights a statistically significant difference in the outcomes between the two groups.
Table 5 provides a detailed comparison of pre- and post-intervention scores for Group A (Maitland Spinal Mobilization, MSM) on two critical measures: the Numeric Pain Rating Scale (NPRS) and the Oswestry Disability Index (ODI).
For pain levels, the pre-intervention mean NPRS score was 6.60. The p-value of P < 0.001 demonstrates a highly significant reduction in pain within Group A.
Similarly, for functional disability, the pre-intervention mean ODI score was 53.00 supported by a p-value of P < 0.001, indicating a marked improvement in the participants' functional outcomes.

TABLE NO 1 – SHOWS THE NORMALITY SCORES OF THE SUBJECTS

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
Age	**A**	15	58.07	11.708	3.023	
	B	15	60.00	10.036	2.591	P<0.001

Group A: Maitland Spinal Mobilization (MSM), Group B: Butler's Neural Mobilization (BNM)

TABLE NO 2 – SHOWS THE DEMOGRAPHIC DATA OF THE SUBJECTS OF BOTH THE GROUPS 1 AND 2

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
Age	**A**	15	58.07	11.708	3.023	
	B	15	60.00	10.036	2.591	P<0.001

Group A: Maitland Spinal Mobilization (MSM), Group B: Butler's Neural Mobilization (BNM)

TABLE NO 3– SHOWS THE NPRS NUMERIC PAIN RATING SCALE GROUP-WISE COMPARISON

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
NPRS PRE	**A**	15	6.60	1.121	.289	1.000
	B	15	6.60	1.121	.289	
NPRS POST	**A**	15	2.60	1.121	.289	P<0.001
	B	15	3.67	1.047	.270	

TABLE NO 4 – SHOWS THE OSWESTRY DISABILITY INDEX (ODI) SCALE GROUP-WISE COMPARISON

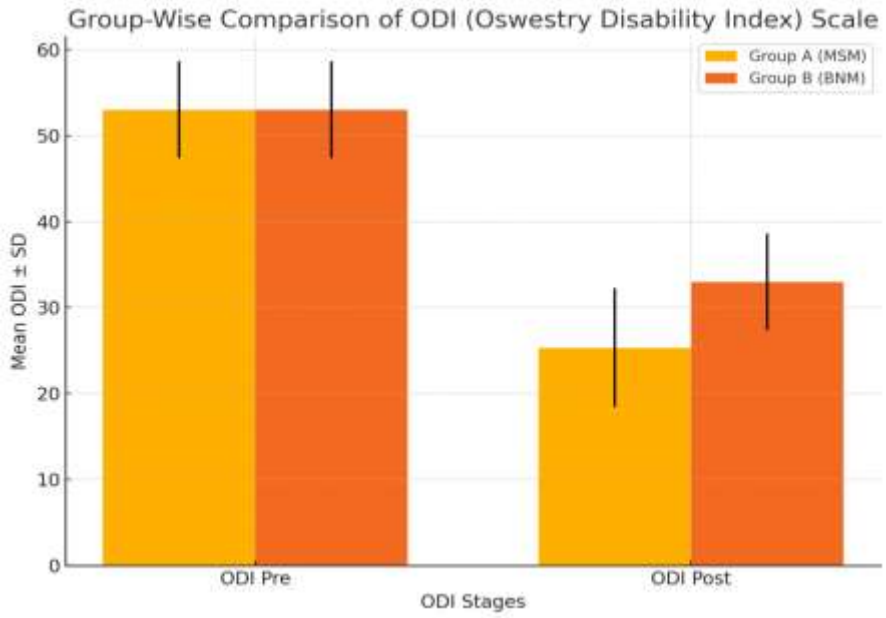
	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
ODI PRE	**A**	15	53.00	5.606	1.447	1.000
	B	15	53.00	5.606	1.447	
ODI POST	**A**	15	25.33	6.935	1.791	P<0.001
	B	15	33.00	5.606	1.447	

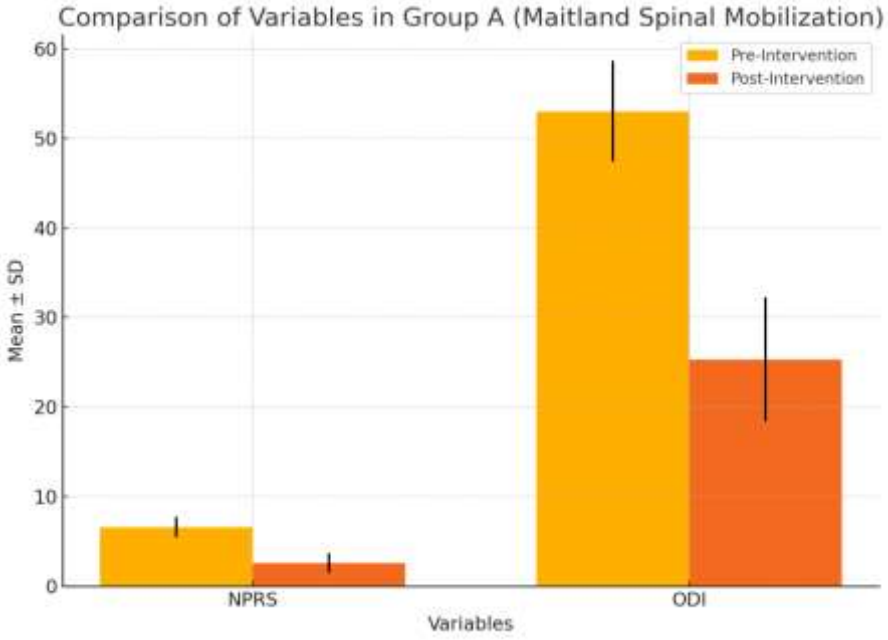
Group A: Maitland Spinal Mobilization (MSM), Group B: Butler's Neural Mobilization (BNM)

TABLE NO 5– SHOWS THE VARIABLES COMPARISON OF THE SUBJECTS OF GROUP 1

		Mean	N	Std. Deviation	Std. Error Mean	P value
Pair 1	**NPRS PRE**	6.60	15	1.121	.289	P<0.001
	NPRS POST	2.60	15	1.121	.289	
Pair 2	**ODI PRE**	53.00	15	5.606	1.447	P<0.001
	ODI POST	25.33	15	6.935	1.791	

Group A: Maitland Spinal Mobilization (MSM), Group B: Butler's Neural Mobilization (BNM)





DISCUSSION

This study compared the effectiveness of Maitland Spinal Mobilization (MSM) and Butler's Neural Mobilization (BNM) in managing pain and disability in lumbar radiculopathy. Both techniques led to significant improvements, highlighting the value of manual therapy. However, MSM demonstrated superior outcomes in reducing pain (NPRS) and improving function (ODI). The greater effectiveness of MSM is attributed to its ability to restore joint mechanics, reduce inflammation, and enhance spinal mobility, whereas BNM primarily reduces neural tension and improves nerve mobility. The findings suggest that while BNM is beneficial, MSM should be prioritized, especially when joint dysfunction is a key factor. Limitations include a small sample size and short intervention period, warranting further research on combined treatments and long-term effects. These results support the importance of tailored interventions addressing both mechanical and neural components for optimal patient outcomes.

RECOMMADATION

•Maitland Spinal Mobilization (MSM) should be prioritized in the treatment of lumbar radiculopathy, particularly in cases where joint dysfunction is a significant contributing factor.
•Butler's Neural Mobilization (BNM) is recommended as a complementary technique for patients with

predominant neural tension or irritation.
•Combining MSM and BNM could be explored in clinical settings to address both joint and neural components of lumbar radiculopathy for enhanced outcomes.
Future Research:
•Conduct studies with larger sample sizes to validate the findings and improve the generalizability of the results.
•Extend the follow-up period to assess the long-term effects of Maitland Spinal Mobilization and Butler's Neural Mobilization.
•Investigate the synergistic effects of combining MSM and BNM to determine whether a multimodal approach offers superior benefits.
•Explore the impact of these manual therapy techniques on different subgroups of lumbar radiculopathy patients, such as those with varying degrees of severity or chronicity.

LIMITATION OF STUDY

1. Small Sample Size - The study included a limited number of participants, which may not represent the broader population with lumbar radiculopathy.
2.Short Intervention Period - The study only assessed short-term outcomes, preventing conclusions about the long-term effectiveness of the treatments.
- Long-term studies are needed to determine if patients experience symptom recurrence or require additional treatment

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