Journal of Health and Rehabilitation Research JHRR

Journal of Health and Rehabilitation Research (2791-156X)
Volume 4, Issue 2
Double Blind Peer Reviewed.
https://jhrlmc.com/
DOI: https://doi.org/10.61919/jhrr.v4i2.1229
www.lmi.education/
LINK MEDICAL INTERFACE

A Comparison of the Effects of Static Stretching and Mulligan Mobilization in Mechanical Neck Pain

Ali Husnain[1], Qadeer Muneer[1], Saira Ashfaq[2], Muhammad Abbas[1], Hafsa Fayyaz[3], Aftab Ansar Lodhi[4]

Correspondence
Ali Husnain
ali.physio123@gmail.com
Affiliations
1 College of Physical Therapy, Government College University Faisalabad, Faisalabad, Pakistan
2 THQ Hospital, Daska, Sialkot, Pakistan
3 University of Health Sciences, Lahore, Pakistan
4 Lahore Chiropractic and Spine Clinic, Johar Town, Lahore, Pakistan

Keywords
Mechanical neck pain, static stretching, Mulligan mobilization, manual therapy, musculoskeletal disorders, neck disability, SNAGs, physical therapy techniques
Disclaimers

Authors' Contributions	All authors contributed equally to the conception, design, data analysis, and manuscript preparation.
Conflict of Interest	None declared
Data/supplements	Available on request.
Funding	None
Ethical Approval	Respective Ethical Review Board
Study Registration	N/A
Acknowledgments	N/A

ABSTRACT
Background: Mechanical neck pain (MNP) is a prevalent musculoskeletal condition associated with pain, stiffness, and functional disability. Poor posture, muscle strain, and repetitive movements are common contributing factors.
Objective: To compare the efficacy of static stretching and Mulligan mobilization techniques in reducing pain and disability associated with MNP.
Methods: This quasi-experimental study recruited 40 patients with MNP, aged 18–35, randomized into two equal groups. Group A received static stretching targeting the upper trapezius, sternocleidomastoid, and levator scapulae, three times weekly for eight weeks. Group B underwent Mulligan mobilization, including sustained natural apophyseal glides (SNAGs), repeated six times per session. Both groups received 20 minutes of transcutaneous electrical nerve stimulation (TENS) and moist heat as baseline treatment. Pain and disability were assessed using the Numeric Pain Rating Scale (NPRS) and Neck Disability Index (NDI) before and after treatment. Data analysis was performed using SPSS v25 with paired and independent t-tests.
Results: Both groups showed significant improvements in NPRS and NDI scores ($p < 0.001$). Group A's NPRS decreased from 5.55 ± 1.05 to 1.70 ± 0.73, while Group B's decreased from 5.65 ± 1.46 to 1.05 ± 0.83. NDI scores reduced from 26.35 ± 3.73 to 8.45 ± 2.85 in Group A and from 27.60 ± 3.31 to 6.40 ± 2.43 in Group B. Mulligan mobilization showed greater improvements ($p < 0.05$).
Conclusion: Both interventions were effective, but Mulligan mobilization demonstrated superior results, suggesting it as a preferred treatment for MNP.

INTRODUCTION
Mechanical neck pain (MNP) is a highly prevalent condition characterized by discomfort and functional limitations in the cervical region, primarily resulting from mechanical factors such as muscle strain, ligament sprain, poor posture, or overuse. This condition affects a substantial portion of the adult population, with prevalence rates reported to range between 30% and 50% globally. MNP is second only to low back pain in terms of common musculoskeletal complaints, underscoring its significant impact on public health and quality of life (1, 2). Commonly, individuals with sedentary lifestyles, prolonged sitting postures, or repetitive neck movements are at higher risk of developing this condition, making it a prominent concern among middle-aged adults and office workers (3).
The hallmark symptoms of MNP include persistent neck pain, stiffness, restricted range of motion (ROM), and muscle spasms, often accompanied by headaches originating at the base of the skull. These symptoms are exacerbated by prolonged static positions, such as sitting at a desk or using handheld electronic devices, which lead to poor postural habits such as forward head posture. This posture increases the mechanical load on cervical structures, contributing to muscular strain, joint dysfunction, and degenerative changes over time (4, 5). Furthermore, technological advancements and increased reliance on smartphones and computers have amplified the burden of MNP, making it a modern epidemic in both clinical and non-clinical populations (6).
Management strategies for MNP focus on alleviating pain, improving functionality, and correcting postural imbalances. Conservative interventions, including manual therapy, stretching, strengthening exercises, and postural training, are commonly employed. Manual therapy techniques, such as Mulligan mobilization, have gained prominence for their ability to reduce pain, enhance joint mobility, and improve neuromuscular control. Mulligan mobilizations, specifically sustained natural apophyseal glides (SNAGs), involve a combination of passive accessory movements and active patient participation, creating a synergistic approach to restore joint kinematics and reduce pain (7). Similarly, static stretching is frequently utilized to target muscle tightness and improve ROM. It involves holding specific positions to elongate shortened musculature, thus reducing muscle tension and promoting flexibility (8).
Numerous studies have explored the efficacy of these interventions. For example, static stretching has shown promise in reducing pain intensity and improving functional outcomes in patients with chronic neck pain, while Mulligan mobilization has demonstrated superior effects on reducing pain and enhancing cervical ROM (9, 10). The physiological basis of these interventions is rooted in their ability to

Manuscript Submitted under JHRR ID 1229: June 29/2024 | Accepted: July 26/2024

modulate pain perception, improve proprioception, and restore normal muscle activation patterns, which are often disrupted in individuals with MNP (11). Despite their widespread use, comparative research on the relative effectiveness of these techniques remains limited, necessitating further investigation.

This study aims to evaluate and compare the therapeutic outcomes of static stretching and Mulligan mobilization in the management of MNP. By employing validated outcome measures such as the Numeric Pain Rating Scale (NPRS) and Neck Disability Index (NDI), this research seeks to provide evidence-based insights into the efficacy of these interventions. It also addresses the clinical need for targeted treatment strategies that optimize functional recovery and pain relief in patients with mechanical neck pain.

MATERIAL AND METHODS

The study was conducted using a quasi-experimental design to compare the effectiveness of static stretching and Mulligan mobilization techniques in the management of mechanical neck pain (MNP). The research was carried out in the outpatient department of Allied Hospital Faisalabad over a period of eight weeks. Ethical approval for the study was obtained from the institutional review board in compliance with the Declaration of Helsinki, ensuring the ethical standards for research involving human participants. Informed consent was obtained from all participants prior to their inclusion in the study.

The sample size comprised 40 patients diagnosed with MNP, who were recruited using non-probability convenient sampling. The participants were equally divided into two groups: Group A, which received static stretching, and Group B, which underwent Mulligan mobilization techniques. The inclusion criteria required participants to have a history of neck pain for at least four months, be between the ages of 18 and 35, and have a Numeric Pain Rating Scale (NPRS) score of ≥4 and a Neck Disability Index (NDI) score of ≥20. Participants were excluded if they had a history of fractures, spinal surgery, nerve pain, head injuries, migraines, spondylolisthesis, or other neurological or orthopedic conditions that could interfere with the outcomes of the interventions.

Baseline treatment was provided to both groups, which included 20 minutes of transcutaneous electrical nerve stimulation (TENS) and moist heat application. Group A received static stretching targeting specific cervical muscles, including the upper trapezius, sternocleidomastoid, and levator scapulae. Each stretching session involved 3-5 repetitions held for 10-30 seconds, conducted three times a week. Group B underwent Mulligan mobilization, including sustained natural apophyseal glides (SNAGs), performed with the participant in a seated position. The therapist applied a sustained passive accessory intervertebral movement in a superoanterior direction along the facet plane while the participant actively moved through the desired range of motion (ROM). Each mobilization was repeated six times per session. Both interventions were provided by licensed physiotherapists with expertise in manual therapy techniques.

Data collection was carried out at baseline and after the eight-week intervention period. Pain intensity and functional disability were assessed using the NPRS and NDI, respectively. The NPRS was used to quantify pain levels on a scale of 0 to 10, with higher scores indicating greater pain severity. The NDI, a standardized measure of neck disability, assessed functional limitations across various daily activities, with scores ranging from 0% (no disability) to 100% (maximum disability).

The data were analyzed using IBM SPSS version 25. The normality of the data was evaluated using the Shapiro-Wilk test. As the data were normally distributed ($p > 0.05$), parametric statistical tests were applied. Within-group comparisons of pre- and post-treatment scores for NPRS and NDI were conducted using paired t-tests, while independent t-tests were employed to compare post-treatment scores between the two groups. A p-value of <0.05 was considered statistically significant. Descriptive statistics, including means and standard deviations, were used to summarize demographic and clinical characteristics of the participants.

The study adhered to rigorous methodological standards to ensure the reliability and validity of the findings. Efforts were made to minimize bias through standardized intervention protocols and objective assessment methods. The sample size, while modest, was sufficient to detect clinically meaningful differences between the two groups. Data integrity was maintained throughout the study, with all analyses conducted independently by a biostatistician to ensure accuracy and transparency.

RESULTS

The study included 40 participants divided equally into two groups: Group A, which received static stretching, and Group B, which underwent Mulligan mobilization. The demographic characteristics and baseline clinical data of the participants were comparable between the groups.

Table 1: Descriptive Statistics of Age

Group	N	Mean Age (Years) ± SD	Min. Age	Max. Age
Group A	20	24.90 ± 4.47	18	35
Group B	20	25.15 ± 4.68	18	34

Table 2: Gender Distribution

Group	Male (N, %)	Female (N, %)
Group A	13 (65%)	7 (35%)
Group B	11 (55%)	9 (45%)

The mean age of participants in Group A was 24.90 ± 4.47 years, while Group B had a mean age of 25.15 ± 4.68 years. The age range was similar for both groups, ensuring comparability. Gender distribution was also comparable between the groups, with a slight predominance of males in both groups. Group A had 65% males and 35% females, while Group B had 55% males and 45% females.

Table 3: Within-Group Comparisons for NPRS and NDI

Variable	Group	Pre-Treatment Mean ± SD	Post-Treatment Mean ± SD	P-Value
NPRS	Group A	5.55 ± 1.05	1.70 ± 0.73	<0.001
NPRS	Group B	5.65 ± 1.46	1.05 ± 0.83	<0.001
NDI	Group A	26.35 ± 3.73	8.45 ± 2.85	<0.001
NDI	Group B	27.60 ± 3.31	6.40 ± 2.43	<0.001

Both groups demonstrated significant improvements in NPRS and NDI scores following the interventions. Group A showed a reduction in NPRS scores from 5.55 ± 1.05 to 1.70 ± 0.73, and in NDI scores from 26.35 ± 3.73 to 8.45 ± 2.85. Similarly, Group B exhibited a decrease in NPRS scores from 5.65 ± 1.46 to 1.05 ± 0.83, and in NDI scores from 27.60 ± 3.31 to 6.40 ± 2.43. The within-group comparisons revealed statistically significant improvements ($p < 0.001$) for both groups.

Table 4: Between-Group Comparisons for NPRS and NDI

Variable	Group A Mean ± SD	Group B Mean ± SD	t-Value	P-Value
NPRS	1.70 ± 0.73	1.05 ± 0.83	2.633	0.012
NDI	8.45 ± 2.85	6.40 ± 2.43	2.442	0.019

The independent t-tests comparing post-treatment outcomes revealed that Group B, which underwent Mulligan mobilization, achieved significantly greater reductions in pain and disability compared to Group A. Group B's mean NPRS score was 1.05 ± 0.83 versus 1.70 ± 0.73 in Group A ($p = 0.012$). Similarly, the mean NDI score in Group B was 6.40 ± 2.43 compared to 8.45 ± 2.85 in Group A ($p = 0.019$).

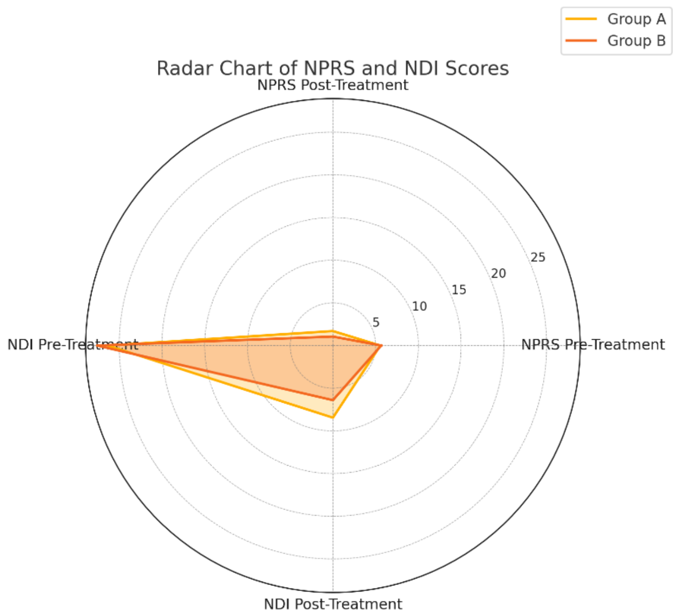

Figure 1 NPRS and NDI Scores

The radar chart provides a comprehensive visualization of NPRS and NDI scores for both groups, showcasing significant improvements post-treatment. Group A's NPRS reduced from 5.55 to 1.70, while Group B improved more substantially from 5.65 to 1.05. Similarly, NDI scores decreased from 26.35 to 8.45 in Group A and from 27.60 to 6.40 in Group B, highlighting the superior efficacy of Mulligan mobilization. The chart emphasizes the multidimensional impact of the interventions, with Group B consistently achieving better outcomes across all measures. Both static stretching and Mulligan mobilization were effective in reducing pain intensity and improving functional disability in patients with mechanical neck pain. However, Mulligan mobilization demonstrated superior outcomes in both NPRS and NDI scores, suggesting its greater efficacy in managing this condition. The findings underscore the importance of incorporating targeted manual therapy techniques for optimal therapeutic outcomes.

DISCUSSION

The results of this study demonstrated that both static stretching and Mulligan mobilization were effective interventions for reducing pain intensity and improving functional disability in patients with mechanical neck pain (MNP). However, Mulligan mobilization showed superior outcomes, with significantly greater reductions in Numeric Pain Rating Scale (NPRS) and Neck Disability Index (NDI) scores compared to static stretching. These findings align with prior research that has consistently reported the efficacy of manual therapy techniques, including Mulligan mobilization, in alleviating pain and improving cervical function (12, 15, 17).

Mulligan mobilization, particularly sustained natural apophyseal glides (SNAGs), has been shown to enhance joint mobility, reduce pain sensitivity, and promote neuromuscular re-education through its unique combination of passive accessory movements and active patient involvement. This dual approach likely contributed to the greater improvements observed in Group B. Previous studies, such as those conducted by Naz et al. and Zemadanis, have highlighted the significant benefits of Mulligan mobilizations in terms of pain relief, increased range of motion (ROM), and enhanced functional abilities, findings that are consistent with the current study (15, 17).

In contrast, static stretching primarily targets muscle tightness and shortness, facilitating increased flexibility and reduced muscle tension. While effective, static stretching may not provide the comprehensive mechanical and neuromuscular benefits associated with Mulligan mobilization, as evidenced by the comparatively smaller improvements in NPRS and NDI scores in Group A (13, 19).

The observed improvements in pain and disability across both groups underscore the importance of early and targeted interventions for MNP. Both techniques addressed critical components of MNP pathology, including muscle tightness, joint dysfunction, and postural imbalances. These results corroborate findings from studies by Mahajan et al. and Ganesh et al., which demonstrated the effectiveness of stretching and mobilization therapies in managing musculoskeletal conditions, particularly chronic neck pain (13, 14). Additionally, the inclusion of baseline treatments, such as transcutaneous electrical nerve stimulation (TENS) and moist heat, likely contributed to the overall improvements by providing initial pain relief and enhancing tissue elasticity (8, 20).

Despite the strengths of the study, several limitations warrant consideration. The sample size was relatively small, which may limit the generalizability of the findings. A larger cohort would provide more robust data and increase the statistical power of the results. Furthermore, the eight-week intervention period, while sufficient for observing short-term effects, may not fully capture the long-term sustainability of the therapeutic outcomes. Longitudinal studies with extended follow-up periods are recommended to assess the durability of these interventions and their potential impact on preventing recurrence of symptoms.

Another limitation was the absence of a control group that received no intervention or only baseline treatment. Including a control group would have allowed for a more precise determination of the specific contributions of static stretching and Mulligan mobilization to the observed improvements. Additionally, the study relied on subjective outcome measures, such as NPRS and NDI, which, although validated and widely used, may introduce a degree of response bias. Incorporating objective measures, such as ROM assessments or electromyographic analyses, could provide a more comprehensive understanding of the physiological effects of these interventions.

The study highlighted the clinical utility of both static stretching and Mulligan mobilization in managing MNP, with Mulligan mobilization emerging as the more effective option. This finding is particularly relevant for clinicians seeking evidence-based approaches to address the increasing prevalence of MNP, driven in part by modern lifestyle factors such as prolonged use of electronic devices and poor posture. Future research should explore the integration of these techniques into multimodal treatment protocols that include strengthening exercises, ergonomic training, and patient education. Such approaches may further enhance the effectiveness of these interventions and promote long-term recovery.

CONCLUSION

In conclusion, while both static stretching and Mulligan mobilization were effective in reducing pain and disability in patients with MNP, Mulligan mobilization demonstrated superior outcomes. This reinforces the value of manual therapy techniques in the management of MNP and provides a strong foundation for future studies aimed at optimizing treatment strategies for this common condition. The study contributed to the growing body of evidence supporting manual therapy and highlighted the need for continued research to address its limitations and expand its applicability in diverse patient populations.

REFERENCES

1. Dennison BS, Leal MH. Mechanical Neck Pain Definition. Manual Therapy for Musculoskeletal Pain Syndromes: An Evidence- and Clinical-Informed Approach. London: Churchill Livingstone; 2015. p. 95.
2. Straker LM, O'Sullivan PB, Smith AJ, Perry MC. Relationships Between Prolonged Neck/Shoulder Pain and Sitting Spinal Posture in Male and Female Adolescents. Manual Therapy. 2009;14(3):321–9.
3. Goode AP, Freburger J, Carey T. Prevalence, Practice Patterns, and Evidence for Chronic Neck Pain. Arthritis Care Res. 2010;62(11):1594–601.
4. Kazeminasab S, Nejadghaderi SA, Amiri P, Pourfathi H, Araj-Khodaei M, Sullman MJ, et al. Neck Pain: Global Epidemiology, Trends and Risk Factors. BMC Musculoskelet Disord. 2022;23:1–13.
5. Bogduk N. The Neck and Headaches. Neurol Clin. 2004;22(1):151–71.
6. El Shunnar K, Nisah MA, Kalaji ZH. The Impact of Excessive Use of Smart Portable Devices on Neck Pain and Associated Musculoskeletal Symptoms. Interdiscip Neurosurg. 2024;101952.
7. Nejati P, Lotfian S, Moezy A, Nejati M. The Study of Correlation Between Forward Head Posture and Neck Pain in Iranian Office Workers. Int J Occup Med Environ Health. 2015;28(2):295–303.
8. Hidalgo B, Hall T, Bossert J, Dugeny A, Cagnie B, Pitance L. The Efficacy of Manual Therapy and Exercise for Treating Non-Specific Neck Pain: A Systematic Review. J Back Musculoskelet Rehabil. 2017;30(6):1149–69.
9. Ylinen J, Takala E-P, Kautiainen H, Nykänen M, Häkkinen A, Pohjolainen T, et al. Association of Neck Pain, Disability and Neck Pain During Maximal Effort With Neck Muscle Strength and Range of Movement in Women With Chronic Non-Specific Neck Pain. Eur J Pain. 2004;8(5):473–8.
10. Keshner EA, Campbell D, Katz R, Peterson B. Neck Muscle Activation Patterns in Humans During Isometric Head Stabilization. Exp Brain Res. 1989;75:335–44.
11. Ojoawo A, Ige B, Kunnuji K. Muscle Energy Technique and Static Stretching in Patients With Mechanical Neck Pain: A Randomized Study. Eur J Clin Exp Med. 2022;1:63–9.
12. Hing W, Bigelow R, Bremner T. Mulligan's Mobilization With Movement: A Systematic Review. J Manipulative Physiol Ther. 2009;17(2):39E–66E.

13. Mahajan R, Kataria C, Bansal K. Comparative Effectiveness of Muscle Energy Technique and Static Stretching for Treatment of Subacute Mechanical Neck Pain. Int J Health Rehabil Sci. 2012;1(1):16–21.
14. Ganesh GS, Mohanty P, Pattnaik M, Mishra C. Effectiveness of Mobilization Therapy and Exercises in Mechanical Neck Pain. Physiother Theory Pract. 2015;31(2):99–106.
15. Naz S, Jamali N, Iftikhar A, Nawaz H, Iqbal T, Ghafoor F. Compare the Effectiveness of Mulligan (NAGs & SNAGs) and McKenzie (Self-Stretching) on Improving the Pain and Functional Ability in Patients With Chronic Neck Pain. Pak J Health Sci. 2023:47–52.
16. Ceylan İ, Canlı M, Kuzu Ş, Tuğyan Ayhan D, Gürses ÖA, Oyman BE, et al. The Effectiveness of Two Different Treatment Approaches in Individuals With Chronic Non-Specific Neck Pain: A Randomized Control Trial. 2023.
17. Zemadanis K. The Short- and Mid-Term Effects of Mulligan Concept in Patients With Chronic Mechanical Neck Pain. J Novel Physiother Rehabil. 2018;2:22–35.
18. Kocaman H, Yıldız NT, Canlı M, Alkan H. Comparison of the Effects of Mulligan Mobilization Technique Combined With Cervical Stabilization Exercises With the Effects of Cervical Stabilization Exercises Alone in Chronic Neck Pain: Randomized Controlled Study. Karya J Health Sci. 2023;4(3):227–34.
19. Riaz F, Haider R, Qamar MM, Basharat A, Manzoor A, Rasul A, et al. Effects of Static Stretching in Comparison With Kaltenborn Mobilization Technique in Nonspecific Neck Pain. BLDE Univ J Health Sci. 2018;3(2):85–8.
20. Deen N, Akhter S, Abbas S. The Effectiveness of Isometric Strengthening With Static Stretching vs. Static Stretching in Nonspecific Chronic Neck Pain. Int J Phys Med Rehabil. 2020;8(4):1–4.
21. Park D-J, Park S-Y. Long-Term Effects of Diagonal Active Stretching Versus Static Stretching for Cervical Neuromuscular Dysfunction, Disability and Pain: An 8 Weeks Follow-Up Study. J Back Musculoskelet Rehabil. 2019;32(3):403–10.