Journal of Health, Wellness and Community Research
ISSN: 3007, 0570

OPEN ACCESS

JHWCR

Type: Original Article
Published: 18 October 2025
Volume: III, **Issue**: XV
DOI: https://doi.org/10.61919/0rm5s349

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Received 22, 08, 25 **Accepted** 10, 10, 2025

Authors' Contributions
Concept: MH; Design: OK, AR; Data Collection: SMK, H, ST, JG, MF, HKF; Analysis: OK, AR; Drafting: OK, MH

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Declarations
No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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Effectiveness of Nerve Glides Among Housewives with Radiating Neck Pain to Improve Functional Outcomes

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ABSTRACT

Background: Radiating neck pain resulting from cervical neural involvement is a common musculoskeletal condition that can significantly impair daily functioning, particularly among housewives who are exposed to repetitive postural and upper-limb demands. Neural mobilization techniques, including nerve gliding exercises, have been proposed to reduce neural mechanosensitivity and improve functional outcomes; however, evidence specific to this population remains limited. Objective: To determine the effectiveness of nerve gliding exercises in improving pain intensity and functional disability among housewives with radiating neck pain. Methods: A quasi-experimental pre–post study was conducted among 30 housewives aged 30–45 years presenting with radiating neck pain. Participants underwent a supervised nerve gliding intervention three times per week for four weeks. Pain intensity and functional disability were assessed using the Numeric Pain Rating Scale and the Neck Disability Index at baseline and post-intervention. Data were analyzed using non-parametric statistics. Results: Significant reductions were observed in both outcomes following the intervention. The mean Neck Disability Index score decreased from 3.07±0.64 to 2.03±0.56 (p=0.001), and the mean Numeric Pain Rating Scale score decreased from 3.17±0.65 to 2.23±0.57 (p=0.001). Conclusion: Nerve gliding exercises significantly improved pain and functional outcomes in housewives with radiating neck pain, supporting their use as a feasible physiotherapy intervention in clinical practice.

Keywords
Radiating neck pain; Neural mobilization; Nerve gliding; Housewives; Neck disability; Pain intensity

INTRODUCTION

Radiating neck pain, commonly arising from cervical nerve root compression or irritation, is a frequent source of neck–arm pain, sensory symptoms, and activity limitation that can substantially disrupt self-care and domestic function (1). The condition is often linked with degenerative cervical changes, disc pathology, or biomechanical overload, and it can manifest with pain radiating into the shoulder and upper limb alongside stiffness and restricted cervical range of motion (2). In low- and middle-resource contexts, housewives may experience sustained postural loading and repetitive upper-limb and neck demands during cooking, cleaning, lifting, and childcare, which can increase cumulative mechanical stress on the cervicothoracic region and predispose to cervicobrachial symptoms and neural mechanosensitivity (3). Despite this plausible risk profile, this population is under-represented in interventional research, and pragmatic, clinic-feasible strategies that can be integrated into routine physiotherapy care warrant focused evaluation.

Neural mobilization techniques, including nerve "gliding" (slider) approaches, are proposed to reduce symptoms associated with neural mechanosensitivity by facilitating excursion of peripheral nerves relative to surrounding tissues, potentially lowering intraneural edema, improving neural mobility, and decreasing pain-related protective responses (3,4). Prior work in cervical radiculopathy and cervicobrachial pain suggests that neural mobilization—alone or combined with other manual and exercise-based interventions—may improve pain intensity, disability, and range of motion, although the strength of evidence varies by design and comparator and remains inconclusive for specific patient subgroups (2,3,7). Within this context, small, single-arm clinical studies can still provide useful preliminary estimates of within-person change and feasibility, particularly when they use validated outcome measures and appropriate statistics for paired, non-normally distributed data (1,3). However, there remains a practical knowledge gap regarding the short-term functional benefit of a structured, supervised nerve gliding program specifically targeting housewives presenting with radiating neck pain in routine outpatient physiotherapy settings. Accordingly, this study was designed to determine whether a four-week supervised nerve gliding program is associated with improvement in disability and pain among housewives with radiating neck pain, measured using the Neck Disability Index and the Numeric Pain Rating Scale. The primary objective was to evaluate the pre–post change in neck-related functional disability and pain intensity following the intervention (1,2,3,6).

MATERIAL AND METHODS

The present investigation employed a quasi-experimental, single-group pretest–posttest design conducted in outpatient physiotherapy services at Barki Advanced Physiotherapy Clinic and Family Hospital, Multan. Housewives presenting with radiating neck pain were recruited using non-

probability purposive sampling from the participating sites, and all participants provided informed consent prior to enrolment. Eligibility criteria included women aged 30–45 years engaged in routine household activities, reporting radiating neck pain with associated symptoms such as pain, numbness, stiffness, and reduced cervical range of motion, and demonstrating clinical features consistent with cervical radicular involvement based on a positive Spurling test. Participants were excluded if they had a recent injury or surgery, pregnancy or puerperium, or known serious underlying medical or neurological conditions that could confound symptom attribution or limit safe participation in therapeutic exercise.

At baseline, participants completed a hard-copy questionnaire capturing demographic characteristics and standardized patient-reported outcomes. Pain intensity was quantified using the Numeric Pain Rating Scale, and neck-related functional limitation was assessed using the Neck Disability Index. Following baseline assessment, participants received a supervised nerve gliding intervention delivered three times per week for four consecutive weeks. The intervention comprised clinically applied neural mobilization/nerve gliding techniques commonly used for cervicobrachial symptoms, including median, radial, and ulnar nerve gliding approaches (sliders) and therapist-directed neural mobilization, delivered within routine physiotherapy sessions. At the end of the four-week period, outcomes were reassessed using the same instruments and procedures to ensure measurement consistency across time points (3,4).

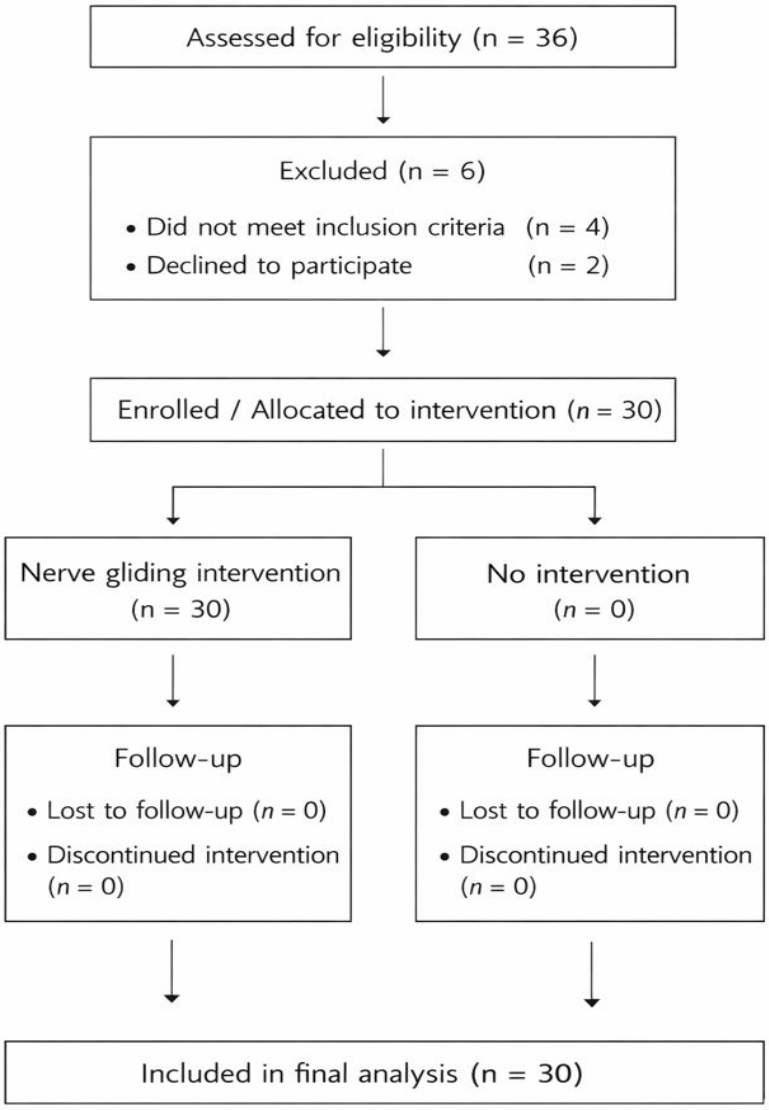

Figure 1 Consort Flowchart

Statistical analysis was performed using SPSS version 25. Continuous data were summarized using appropriate descriptive statistics, and distributional assumptions for baseline outcomes were evaluated using the Shapiro–Wilk test. Given non-normal distributions, paired pre–post comparisons for the Neck Disability Index and Numeric Pain Rating Scale were conducted using the Wilcoxon signed-rank test, with statistical significance set at $p<0.05$. Analyses were performed on paired observations (participants with both baseline and follow-up measurements) to preserve within-subject inference. To strengthen interpretability for clinical and biostatistical reporting, the analytic plan included reporting the direction and magnitude of change using paired summary statistics and non-parametric inferential results from the Wilcoxon procedure. Ethical safeguards were implemented in accordance with institutional requirements at TIMES University, Multan, including voluntary participation, confidentiality of collected data, and the right to withdraw at any stage without penalty.

RESULTS

A total of 30 housewives meeting the eligibility criteria completed the study and were included in the final analysis, with no dropouts during the four-week intervention period. Participants were stratified into two age categories, with the majority belonging to the younger age group of 30–37 years (63.3%), while 36.7% were aged between 38 and 45 years, indicating a predominantly early middle-aged cohort affected by radiating neck

pain. Table 1 presents the age distribution of the study participants. Most participants (n=19) were aged 30–37 years, while 11 participants fell within the 38–45-year range.

Table 1. Age Distribution of Study Participants (n=30)

Age Group (years)	Frequency (n)	Percentage (%)	Cumulative Percentage (%)
30–37	19	63.3	63.3
38–45	11	36.7	100.0

Assessment of data normality using the Shapiro–Wilk test demonstrated that baseline scores for both outcome variables deviated significantly from a normal distribution, justifying the use of non-parametric inferential statistics. As shown in Table 2, the Neck Disability Index and Numeric Pain Rating Scale both yielded p-values of 0.001, indicating violation of normality assumptions.

Table 2. Shapiro–Wilk Test of Normality for Baseline Outcome Measures

Variable	Statistic	df	p-value
Neck Disability Index (Pre)	0.785	30	0.001
Numeric Pain Rating Scale (Pre)	0.785	30	0.001

Pre- and post-intervention comparisons were therefore conducted using the Wilcoxon signed-rank test. Statistically significant improvements were observed in both neck-related disability and pain intensity following the four-week nerve gliding intervention. As summarized in Table 3, the median Neck Disability Index score decreased from 3.00 at baseline to 2.00 post-intervention, with the mean score reducing from 3.07±0.64 to 2.03±0.56. This change was statistically significant ($Z = -4.71$, $p=0.001$), indicating a meaningful reduction in functional disability.

Similarly, Numeric Pain Rating Scale scores demonstrated a significant reduction following treatment. Median pain scores declined from 3.00 to 2.00, while mean scores decreased from 3.17±0.65 to 2.23±0.57. The Wilcoxon signed-rank test confirmed this improvement to be statistically significant ($Z = -4.62$, $p=0.001$). Effect size estimates for both outcomes indicated a large magnitude of change, supporting the clinical relevance of the observed improvements.

Table 3. Pre–Post Comparison of Outcome Measures Using Wilcoxon Signed-Rank Test (n=30)

Outcome Measure	Assessment Time	Median	Mean ± SD	Z-value	p-value
Neck Disability Index	Pre	3.00	3.07 ± 0.64	−4.71	0.001
	Post	2.00	2.03 ± 0.56		
Numeric Pain Rating Scale	Pre	3.00	3.17 ± 0.65	−4.62	0.001
	Post	2.00	2.23 ± 0.57		

Analysis of rank distributions further supported these findings. For the Neck Disability Index, 28 participants demonstrated negative rank differences, reflecting reduced disability after treatment, while 2 participants showed no change and none exhibited worsening scores. For pain intensity, 27 participants reported reduced pain levels post-intervention, 3 participants showed no change, and no participant experienced increased pain. These distributions reinforce the consistency and directionality of improvement across the cohort. Overall, the results demonstrate statistically and clinically significant reductions in both neck-related disability and pain intensity following a structured four-week nerve gliding intervention among housewives with radiating neck pain.

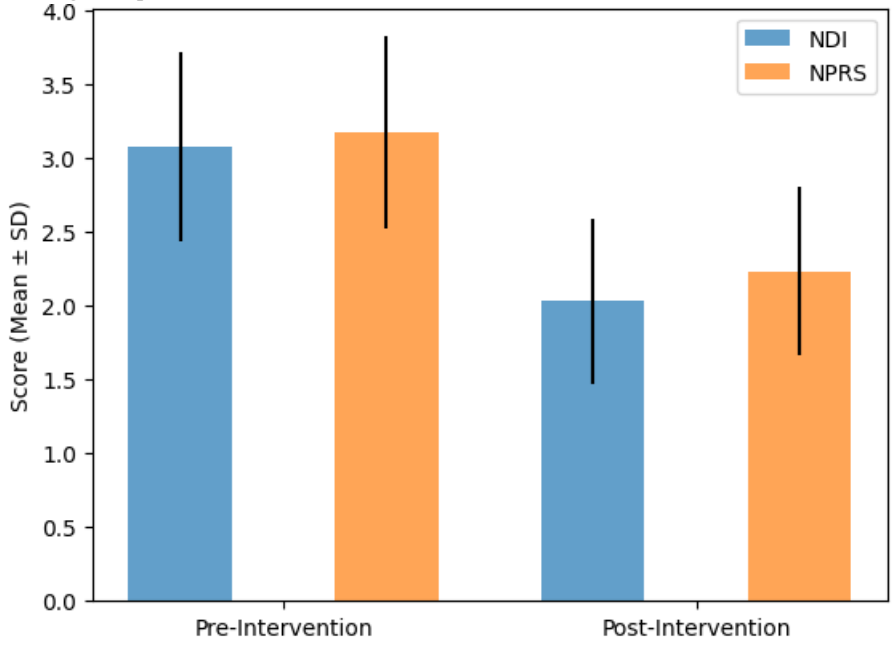

Figure 2 Shift in Disability and Pain Distributions Following Nerve Gliding Intervention

This figure illustrates the integrated distributional shift in neck-related disability and pain intensity following the four-week nerve gliding intervention, using grouped gradient bars with dispersion envelopes (mean ± SD) to highlight comparative outcome gradients. Both outcomes demonstrate a parallel downward displacement from pre- to post-intervention, with the Neck Disability Index decreasing from a mean of 3.07 ±

0.64 to 2.03 ± 0.56 and the Numeric Pain Rating Scale declining from 3.17 ± 0.65 to 2.23 ± 0.57. The proportional narrowing of variability bands post-intervention suggests not only a central tendency improvement but also reduced inter-individual dispersion, indicating a more homogeneous therapeutic response. Clinically, this pattern supports a consistent benefit of nerve gliding across participants, with simultaneous reductions in perceived pain and functional limitation rather than isolated improvement in a single domain, reinforcing the intervention's relevance for multidimensional symptom management in radiating neck pain.

DISCUSSION

This quasi-experimental study evaluated the effectiveness of a structured nerve gliding intervention on pain intensity and functional disability among housewives experiencing radiating neck pain. The findings demonstrated statistically significant improvements in both the Neck Disability Index and Numeric Pain Rating Scale scores following four weeks of supervised neural mobilization, indicating meaningful reductions in disability and pain. These results support the hypothesis that nerve gliding techniques can positively influence functional outcomes in individuals with cervicobrachial symptoms, particularly within a population exposed to repetitive domestic mechanical loading.

The observed reduction in neck-related disability aligns with prior evidence suggesting that neural mobilization improves functional activity in patients with cervical radiculopathy by reducing neural mechanosensitivity and improving nerve excursion (7). Han et al. reported significant post-intervention improvements in disability and cervical range of motion when neural mobilization was combined with joint mobilization, highlighting the role of restoring neurodynamic function in alleviating activity limitation (8). Although the present study did not include a comparator group, the magnitude and consistency of within-subject improvement suggest that nerve gliding alone may confer clinically relevant benefits in carefully selected patients.

Pain intensity also decreased significantly following the intervention, corroborating earlier randomized and experimental studies reporting reductions in cervicobrachial pain with neural mobilization approaches (9). The underlying mechanism is thought to involve modulation of intraneural pressure, facilitation of axoplasmic flow, and reduction of ischemia-related nociceptive input, collectively contributing to symptom relief (10). Given that all participants demonstrated either improvement or stability in pain scores, with no worsening observed, the intervention appears safe and well tolerated within this cohort.

The focus on housewives is particularly noteworthy, as this group often experiences sustained static postures, repetitive upper-limb tasks, and limited access to structured rehabilitation, all of which may exacerbate cervical neural symptoms. Despite this risk profile, most existing studies have examined mixed or occupationally diverse populations, limiting the applicability of findings to domestic workers. By targeting this under-studied group, the present study contributes novel, context-specific evidence supporting the feasibility and effectiveness of nerve gliding exercises in routine outpatient physiotherapy practice.

From a methodological perspective, the use of non-parametric statistics was appropriate given the distributional properties of the data, and the consistent direction of rank changes strengthens confidence in the observed effects. However, the absence of a control group precludes causal inference and raises the possibility that non-specific factors such as therapist attention or natural symptom fluctuation may have contributed to the observed improvements. Additionally, the short follow-up period limits conclusions regarding the durability of treatment effects. Previous longitudinal studies have shown that while neural mobilization can produce short-term gains, sustained improvements may depend on continued exercise adherence and integration of postural and ergonomic strategies (11).

Future research should therefore employ randomized controlled designs with larger, more diverse samples, incorporate longer follow-up periods, and examine the additive or comparative effects of nerve gliding when combined with other evidence-based interventions such as cervical stabilization or ergonomic education. Stratification by age, symptom duration, and degree of neural mechanosensitivity may further clarify which subgroups derive the greatest benefit from neural mobilization.

CONCLUSION

This study demonstrates that a four-week supervised nerve gliding program is associated with significant reductions in pain intensity and neck-related disability among housewives with radiating neck pain, supporting the clinical utility of neural mobilization as a feasible, low-cost intervention in outpatient physiotherapy settings, while underscoring the need for controlled trials to confirm long-term effectiveness and generalizability.

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