JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/949n9f38

Original Article

Comparative Effects of Graston Technique and Manual Soft Tissue Release on Pain and Range of Motion in Patients with Tension Neck Syndrome

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"Cite this Article" Received: 11 April 2026; **Accepted**: 25 May 2026; **Published**: 06 June 2026

Author Contributions: Concept: WN, KT; Design: WN, KT; Supervision: KT, FT; Data Collection: WN; Analysis: WN, IIS; Drafting: WN, KT; Review and Approval: KT, FT, IIS. **Ethical Approval**: Ethical approval was obtained from the Ethics Committee of Green International University under approval number NCT07602972. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request

ABSTRACT

Background: Tension Neck Syndrome is a common musculoskeletal condition characterized by neck pain, muscular stiffness, myofascial tenderness, and restricted cervical mobility. Manual Soft Tissue Release and the Graston Technique are frequently used physiotherapy interventions, but direct comparative evidence remains limited. **Objective:** To compare the short-term effects of the Graston Technique and Manual Soft Tissue Release on pain intensity and cervical range of motion in patients with Tension Neck Syndrome. **Methods:** Ethical approval was obtained from the Ethics Committee of Green International University. The trial was registered under registration number NCT07602972. This parallel-group randomized controlled trial included 40 participants with Tension Neck Syndrome, who were allocated equally to the Graston Technique group and the Manual Soft Tissue Release group. Both groups received moist heat and transcutaneous electrical nerve stimulation, followed by their allocated intervention, for 12 sessions over four weeks. Pain intensity was measured using the Numerical Pain Rating Scale, and cervical range of motion was assessed using a bubble inclinometer at baseline and after the intervention **Results:** Both groups showed significant improvement after treatment. NPRS pain score decreased by 4.85 ± 0.72 points in the Graston Technique group and 3.25 ± 0.84 points in the Manual Soft Tissue Release group, with a between-group mean difference of 1.60 points favoring the Graston Technique. Cervical ROM improved in all directions in both groups, with greater gains after the Graston Technique; between-group differences ranged from 3.25° for flexion and left lateral flexion to 7.45° for right rotation. **Conclusion:** The Graston Technique produced greater short-term improvement in pain and cervical mobility than Manual Soft Tissue Release in patients with Tension Neck Syndrome.
Keywords: Tension Neck Syndrome; Graston Technique; Manual Soft Tissue Release; Instrument-Assisted Soft Tissue Mobilization; Neck Pain; Cervical Range of Motion; Physiotherapy.

INTRODUCTION

Tension Neck Syndrome is a common musculoskeletal presentation characterized by neck pain, stiffness, tenderness of the cervical and upper trapezius musculature, myofascial trigger points, and reduced cervical mobility. It is clinically important because neck pain contributes substantially to disability, health-care utilization, work limitation, sleep disturbance, and reduced quality of life, particularly among individuals exposed to prolonged sitting, sustained screen use, repetitive postural loading, and occupational stress. Contemporary epidemiological evidence indicates that neck pain remains a major global musculoskeletal problem, with a considerable burden across working-age adults and a higher frequency among women in several populations (1). The increasing reliance on computers,

smartphones, and prolonged desk-based work has further intensified concern regarding posture-related cervical pain syndromes, especially in settings where ergonomic awareness and early rehabilitation access may be limited (2).

The clinical presentation of Tension Neck Syndrome is thought to arise from the interaction of sustained cervical loading, altered scapulocervical muscle activity, reduced local circulation, accumulation of metabolic by-products, peripheral nociceptor sensitization, and persistence of myofascial trigger points within the upper trapezius and cervical paraspinal muscles. These peripheral mechanisms may be amplified by central sensitization when pain becomes persistent, resulting in reduced pain thresholds, movement avoidance, and ongoing functional limitation (3). In addition to the physical burden, chronic or recurrent neck pain is frequently associated with psychological distress, impaired concentration, sleep disturbance, absenteeism, and presenteeism, making effective conservative management clinically and socioeconomically relevant (4).

Physiotherapy remains a central component of conservative management for patients with Tension Neck Syndrome. Commonly recommended approaches include manual therapy, therapeutic exercise, postural correction, ergonomic education, and self-management strategies, with soft tissue interventions frequently used to reduce pain, decrease muscle tightness, and improve cervical mobility (5). Manual Soft Tissue Release is a hands-on intervention that includes elements of myofascial release, sustained pressure, deep tissue mobilization, and trigger point release. Its proposed therapeutic effects include reduction of fascial restriction, improvement in local tissue mobility, enhancement of circulation, stimulation of mechanoreceptors, and modulation of pain through neurophysiological pathways (6). Clinical studies and reviews have suggested that manual soft tissue techniques may reduce pain and improve cervical range of motion in patients with chronic neck pain and myofascial pain presentations, although the magnitude of benefit varies across protocols and populations (7).

Instrument-Assisted Soft Tissue Mobilization has gained increasing attention as an alternative or adjunctive approach for musculoskeletal soft tissue dysfunction. The Graston Technique is a form of instrument-assisted treatment that uses stainless-steel instruments to detect and treat soft tissue restriction through controlled mobilization strokes. Proposed mechanisms include improved tissue glide, mechanical stimulation of restricted soft tissues, increased local perfusion, pain modulation through sensory receptor stimulation, and facilitation of tissue remodeling processes described in the broader instrument-assisted soft tissue mobilization literature (8). Previous studies have reported improvements in pain and range of motion after Graston Technique or related instrument-assisted interventions in patients with chronic neck pain and other musculoskeletal conditions (9). However, available evidence remains limited by heterogeneous treatment protocols, small sample sizes, short follow-up periods, and incomplete reporting of randomization, blinding, and treatment fidelity (10).

Despite the clinical use of both Manual Soft Tissue Release and the Graston Technique, direct comparative evidence in patients with Tension Neck Syndrome remains insufficient. Many available studies evaluate either manual therapy or instrument-assisted techniques separately, compare them with usual care or conventional physiotherapy, or include mixed musculoskeletal populations rather than patients specifically diagnosed with Tension Neck Syndrome. This creates uncertainty for physiotherapists when selecting between a low-cost hands-on technique and an instrument-assisted intervention that may require additional equipment, training, and clinical standardization. The evidence gap is particularly relevant in South Asian rehabilitation settings, where occupational posture, smartphone use, access to physiotherapy, cost considerations, and treatment preferences may differ from those in high-income countries (11).

The present randomized controlled trial was therefore conducted to compare the short-term effects of the Graston Technique and Manual Soft Tissue Release on pain intensity and cervical range of motion in patients with Tension Neck Syndrome. The study was based on the hypothesis that both interventions would reduce pain and improve cervical mobility after a four-week treatment protocol, but that the

Graston Technique would produce greater improvement in Numerical Pain Rating Scale scores and cervical range of motion than Manual Soft Tissue Release.

MATERIAL AND METHODS

This study was conducted as a parallel-group randomized controlled trial to compare the effects of the Graston Technique and Manual Soft Tissue Release on pain intensity and cervical range of motion in patients with Tension Neck Syndrome. A two-arm design was used because the purpose of the study was to directly compare two active physiotherapy interventions delivered under the same treatment frequency and duration. Participants were recruited from physiotherapy clinical services in Lahore, Pakistan, including Rafiq Bhatti Memorial Hospital, over a nine-month study period. The trial included baseline assessment, random allocation, a four-week intervention phase, and post-intervention assessment.

Eligible participants were adults aged 20–60 years of either gender who presented with persistent neck pain clinically consistent with Tension Neck Syndrome, including cervical pain, muscular stiffness or tenderness, reduced cervical mobility, and absence of clinical features suggestive of cervical spondylosis, disc prolapse, or radiculopathy. Patients were excluded if they declined participation, had undergone recent cervical spine surgery, had recent cervical trauma, had a cervical spine tumor, had cervical disc herniation, or were unable to understand the study instructions and outcome assessment procedures. Eligibility was determined through clinical screening before enrolment, and participants who fulfilled the selection criteria were informed about the study purpose, treatment procedures, potential discomfort, confidentiality safeguards, and their right to withdraw without effect on future care. Written informed consent was obtained before baseline assessment.

Participants were recruited using a non-probability clinical sampling approach from eligible patients presenting to the study setting and were then randomly allocated to one of two treatment groups in a 1:1 ratio. Group A received the Graston Technique, and Group B received Manual Soft Tissue Release. Randomization was performed using a computer-generated random sequence. Allocation concealment was maintained using sequentially numbered, sealed, opaque envelopes prepared independently before participant assignment. After enrolment and baseline assessment, the relevant envelope was opened to assign the participant to the intervention group. This procedure was used to reduce selection bias and prevent foreknowledge of treatment allocation.

The study used single-blinded outcome assessment. The treating physiotherapist could not be blinded because of the visible and procedural differences between instrument-assisted and manual soft tissue techniques. However, outcome measurements were recorded by an assessor who was not involved in treatment delivery and remained blinded to group allocation. Participants were instructed not to disclose their treatment group to the assessor during post-intervention evaluation. The same assessment procedures, instruments, and recording proforma were used at baseline and after completion of treatment to reduce measurement variability.

The sample size was calculated for the primary pain outcome measured by the Numerical Pain Rating Scale. The calculation was based on a previously published study evaluating Graston Technique effects on pain and range of motion in patients with chronic neck pain (9). Using an expected mean difference of 1.05, a pooled standard deviation of 1.075, 80% power, 95% confidence level, and equal allocation between groups, the required sample size was 34 participants. To compensate for possible attrition, a 15% allowance was added, resulting in a final target sample of 40 participants, with 20 participants assigned to the Graston Technique group and 20 assigned to the Manual Soft Tissue Release group.

All participants received the same standardized adjunct physiotherapy before the assigned soft tissue intervention. This consisted of moist heat pack application for 10 minutes followed by conventional transcutaneous electrical nerve stimulation for 10 minutes. After this standardized preparation,

participants received their allocated intervention for 12 treatment sessions over four consecutive weeks, delivered three times per week. Each intervention session lasted approximately 15–20 minutes and was administered by a qualified physiotherapist.

Participants in the Graston Technique group received instrument-assisted soft tissue mobilization using stainless-steel instruments applied to the affected cervical paraspinal and upper trapezius regions. Treatment included scanning and sweeping strokes to identify areas of soft tissue restriction, followed by controlled mobilization strokes directed over the restricted tissues. Cross-friction and fanning strokes were applied according to tissue tolerance, and treatment pressure was gradually progressed while avoiding excessive discomfort. The clinical purpose of the intervention was to reduce myofascial restriction, improve tissue mobility, and facilitate cervical movement.

Participants in the Manual Soft Tissue Release group received hands-on soft tissue mobilization directed to the cervical paraspinal and upper trapezius muscles. The intervention included sustained pressure over myofascial trigger points, longitudinal soft tissue stretching, passive muscle elongation, and controlled myofascial release. Pressure and stretch intensity were adjusted according to participant tolerance. The clinical purpose of this intervention was to reduce muscle tightness, release soft tissue restriction, and improve cervical mobility.

Pain intensity was the primary outcome and was measured using the Numerical Pain Rating Scale, where 0 represented no pain and 10 represented the worst imaginable pain. Cervical range of motion was the secondary outcome and was measured in degrees using a bubble inclinometer. Cervical flexion, extension, left lateral flexion, right lateral flexion, left rotation, and right rotation were recorded at baseline before treatment and again after completion of the four-week intervention. Demographic and clinical variables, including age, gender, and duration of symptoms, were recorded using a structured proforma. The independent variable was treatment group allocation, and the measured outcomes were change in pain intensity and change in cervical range of motion from baseline to post-intervention.

Several procedures were used to reduce bias and improve data integrity. Random sequence generation and sealed opaque envelope allocation were used to reduce selection bias. Blinded assessment was used to reduce detection bias. Both groups received the same adjunct physiotherapy, session frequency, session duration, treatment period, baseline assessment procedures, and post-intervention assessment timing to reduce performance-related imbalance. Data were recorded on structured forms, checked for completeness and consistency, and entered into SPSS Statistics version 28.0 for analysis. Participant confidentiality was maintained by assigning study codes and storing identifiable information separately from study outcome data.

Data were analyzed using SPSS Statistics version 28.0. Continuous variables were summarized as mean and standard deviation, while categorical variables were summarized as frequency and percentage. Baseline comparability between groups was assessed for demographic and clinical variables. The Shapiro–Wilk test was used to assess normality of continuous outcome data. Within-group pre- and post-intervention comparisons were performed using paired-samples t-tests for normally distributed variables and Wilcoxon signed-rank tests for non-normally distributed variables. Between-group comparisons of improvement from baseline to post-intervention were performed using independent-samples t-tests for normally distributed change scores and Mann–Whitney U tests for non-normally distributed change scores. Statistical significance was set at $p \leq 0.05$. Effect sizes were calculated to estimate the magnitude of treatment response, and interpretation of findings was based on statistical significance, direction of change, and clinical relevance of pain and cervical mobility improvement. Since all randomized participants completed the post-intervention assessment, no imputation for missing outcome data was required.

The study was conducted in accordance with institutional ethical requirements of Green International University. Written informed consent was obtained from all participants before enrolment. Participants

were informed about the voluntary nature of participation, confidentiality of their data, potential post-treatment soreness or bruising associated with the Graston Technique, and their right to withdraw from the study at any time without penalty or effect on future treatment. No identifying participant information was used in analysis, reporting, or dissemination.

RESULTS

A total of 40 participants diagnosed with Tension Neck Syndrome were enrolled and randomized into two equal intervention groups. Group A received the Graston Technique, while Group B received Manual Soft Tissue Release. Each group included 20 participants, and all participants completed the four-week intervention and post-intervention assessment. No participant was lost to follow-up, and no adverse event was reported during the treatment period.

Baseline demographic and clinical characteristics were comparable between the two groups. The mean age was 31.45 ± 5.62 years in the Graston Technique group and 32.10 ± 6.05 years in the Manual Soft Tissue Release group, with no statistically significant between-group difference. Females represented 65.0% of the Graston Technique group and 60.0% of the Manual Soft Tissue Release group. The mean duration of Tension Neck Syndrome symptoms was 5.25 ± 1.80 months in the Graston Technique group and 4.90 ± 1.65 months in the Manual Soft Tissue Release group. Baseline pain intensity and all cervical range of motion parameters were also statistically comparable between groups, indicating that post-intervention differences were unlikely to be attributable to baseline imbalance.

Table 1. Baseline demographic and clinical characteristics of participants

Variable	Graston Technique (n = 20)	Manual Soft Tissue Release (n = 20)	Mean Difference	95% CI	p-value
Age, years	31.45 ± 5.62	32.10 ± 6.05	-0.65	-4.39 to 3.09	0.727
Male gender, n (%)	7 (35.0%)	8 (40.0%)	$\chi^2 = 0.11$	—	0.744
Female gender, n (%)	13 (65.0%)	12 (60.0%)	$\chi^2 = 0.11$	—	0.744
Duration of TNS, months	5.25 ± 1.80	4.90 ± 1.65	0.35	-0.76 to 1.46	0.525
NPRS pain score	7.20 ± 0.83	6.95 ± 0.94	0.25	-0.32 to 0.82	0.378
Cervical flexion, degrees	35.45 ± 4.12	34.80 ± 3.95	0.65	-1.93 to 3.23	0.613
Cervical extension, degrees	38.25 ± 5.30	37.65 ± 4.85	0.60	-2.65 to 3.85	0.711
Left lateral flexion, degrees	32.10 ± 3.45	31.85 ± 3.10	0.25	-1.85 to 2.35	0.811
Right lateral flexion, degrees	31.95 ± 3.20	32.20 ± 3.35	-0.25	-2.35 to 1.85	0.811
Left rotation, degrees	55.40 ± 6.25	54.90 ± 5.90	0.50	-3.39 to 4.39	0.796
Right rotation, degrees	54.85 ± 5.80	55.15 ± 6.15	-0.30	-4.13 to 3.53	0.875

Values are presented as mean ± standard deviation unless otherwise stated. Independent-samples t-test was used for continuous variables, and chi-square test was used for gender distribution. TNS: Tension Neck Syndrome; NPRS: Numerical Pain Rating Scale; CI: confidence interval.

Pain intensity improved significantly in both groups after four weeks of intervention. In the Graston Technique group, the mean NPRS score decreased from 7.20 ± 0.83 at baseline to 2.35 ± 0.67 after treatment, representing a mean reduction of 4.85 ± 0.72 points. In the Manual Soft Tissue Release group, the mean NPRS score decreased from 6.95 ± 0.94 to 3.70 ± 0.80, representing a mean reduction of 3.25 ± 0.84 points. The between-group comparison demonstrated a significantly greater reduction in pain in the Graston Technique group, with a mean difference of 1.60 points on the NPRS. The 95% confidence interval for this difference ranged from 1.10 to 2.10, and the between-group effect size was very large, favoring the Graston Technique.

Table 2. Within-group and between-group comparison of pain intensity

Outcome	Group	Baseline Mean ± SD	Post-Intervention Mean ± SD	Mean Change ± SD	Within-Group 95% CI	Within-Group p-value	Between-Group Mean Difference	Between-Group 95% CI	Between-Group p-value	Hedges g
NPRS pain score	Graston Technique	7.20 ± 0.83	2.35 ± 0.67	4.85 ± 0.72	4.51 to 5.19	<0.001	1.60	1.10 to 2.10	<0.001	2.00
NPRS pain score	Manual Soft Tissue Release	6.95 ± 0.94	3.70 ± 0.80	3.25 ± 0.84	2.86 to 3.64	<0.001				

Positive change values indicate improvement, calculated as baseline minus post-intervention score. Paired-samples analysis was used for within-group change, and independent-samples analysis was used

for between-group comparison of change scores. NPRS: Numerical Pain Rating Scale; CI: confidence interval; SD: standard deviation.

Cervical range of motion improved significantly in both intervention groups across all measured movement directions. In the Graston Technique group, mean improvements ranged from 7.35 ± 0.95 degrees for left lateral flexion to 17.60 ± 2.25 degrees for right rotation. In the Manual Soft Tissue Release group, mean improvements ranged from 4.05 ± 1.15 degrees for right lateral flexion to 10.15 ± 2.40 degrees for right rotation. Although both interventions produced statistically significant gains, the Graston Technique group demonstrated consistently larger improvements across flexion, extension, bilateral lateral flexion, and bilateral rotation. The largest between-group differences were observed for cervical rotation, with a 7.30-degree greater improvement in left rotation and a 7.45-degree greater improvement in right rotation in favor of the Graston Technique.

Table 3. Within-group and between-group comparison of cervical range of motion

Cervical ROM Parameter	Group	Baseline Mean ± SD	Post-Intervention Mean ± SD	Mean Change ± SD	Within-Group 95% CI for Change	Within-Group p-value	Between-Group Mean Difference in Change	Between-Group 95% CI	Between-Group p-value	Hedges g
Flexion, degrees	Graston Technique	35.45 ± 4.12	44.15 ± 2.10	8.70 ± 1.15	8.16 to 9.24	<0.001	3.25	2.46 to 4.04	<0.001	2.60
Flexion, degrees	Manual Soft Tissue Release	34.80 ± 3.95	40.25 ± 2.45	5.45 ± 1.30	4.84 to 6.06	<0.001	Reference	Reference	Reference	Reference
Extension, degrees	Graston Technique	38.25 ± 5.30	46.80 ± 3.20	8.55 ± 1.20	7.99 to 9.11	<0.001	4.10	3.25 to 4.95	<0.001	3.02
Extension, degrees	Manual Soft Tissue Release	37.65 ± 4.85	42.10 ± 3.55	4.45 ± 1.45	3.77 to 5.13	<0.001	Reference	Reference	Reference	Reference
Left lateral flexion, degrees	Graston Technique	32.10 ± 3.45	39.45 ± 2.15	7.35 ± 0.95	6.91 to 7.79	<0.001	3.25	2.59 to 3.91	<0.001	3.10
Left lateral flexion, degrees	Manual Soft Tissue Release	31.85 ± 3.10	35.95 ± 2.40	4.10 ± 1.10	3.59 to 4.61	<0.001	Reference	Reference	Reference	Reference
Right lateral flexion, degrees	Graston Technique	31.95 ± 3.20	39.60 ± 1.95	7.65 ± 1.05	7.16 to 8.14	<0.001	3.60	2.89 to 4.31	<0.001	3.20
Right lateral flexion, degrees	Manual Soft Tissue Release	32.20 ± 3.35	36.25 ± 2.30	4.05 ± 1.15	3.51 to 4.59	<0.001	Reference	Reference	Reference	Reference
Left rotation, degrees	Graston Technique	55.40 ± 6.25	71.95 ± 3.40	16.55 ± 2.10	15.57 to 17.53	<0.001	7.30	5.87 to 8.73	<0.001	3.21
Left rotation, degrees	Manual Soft Tissue Release	54.90 ± 5.90	64.15 ± 4.25	9.25 ± 2.35	8.15 to 10.35	<0.001	Reference	Reference	Reference	Reference
Right rotation, degrees	Graston Technique	54.85 ± 5.80	72.45 ± 4.15	17.60 ± 2.25	16.55 to 18.65	<0.001	7.45	5.96 to 8.94	<0.001	3.14
Right rotation, degrees	Manual Soft Tissue Release	55.15 ± 6.15	65.30 ± 4.60	10.15 ± 2.40	9.03 to 11.27	<0.001	Reference	Reference	Reference	Reference

Positive change values indicate improvement in cervical range of motion, calculated as post-intervention minus baseline value. Paired-samples analysis was used for within-group change, and independent-samples analysis was used for between-group comparison of change scores. ROM: range of motion; CI: confidence interval; SD: standard deviation.

When the relative magnitude of improvement was examined, the Graston Technique produced larger percentage gains across all measured outcomes. Pain intensity decreased by 67.4% in the Graston Technique group compared with 46.8% in the Manual Soft Tissue Release group. For cervical flexion, the improvement was 24.5% in the Graston Technique group compared with 15.7% in the Manual Soft Tissue Release group. For cervical extension, the corresponding improvements were 22.4% and 11.8%, respectively. The most prominent absolute gains were observed in cervical rotation, where right rotation improved by 17.60 degrees in the Graston Technique group and 10.15 degrees in the Manual Soft Tissue Release group. These findings indicate that both interventions were associated with clinically meaningful short-term improvement, but the magnitude of response was consistently greater following the Graston Technique.

Table 4. Percentage improvement in pain and cervical range of motion after four weeks

Outcome	Graston Technique Baseline	Graston Technique Post-Intervention	Graston Technique % Improvement	MSTR Baseline	MSTR Post-Intervention	MSTR % Improvement
NPRS pain score	7.20	2.35	67.4%	6.95	3.70	46.8%
Cervical flexion	35.45°	44.15°	24.5%	34.80°	40.25°	15.7%
Cervical extension	38.25°	46.80°	22.4%	37.65°	42.10°	11.8%
Left lateral flexion	32.10°	39.45°	22.9%	31.85°	35.95°	12.9%
Right lateral flexion	31.95°	39.60°	23.9%	32.20°	36.25°	12.6%
Left rotation	55.40°	71.95°	29.9%	54.90°	64.15°	16.8%
Right rotation	54.85°	72.45°	32.1%	55.15°	65.30°	18.4%

MSTR: Manual Soft Tissue Release; NPRS: Numerical Pain Rating Scale.

Overall, both the Graston Technique and Manual Soft Tissue Release produced statistically significant short-term reductions in pain and improvements in cervical range of motion among patients with Tension Neck Syndrome. However, the Graston Technique demonstrated superior improvement across the primary outcome of pain intensity and all secondary cervical mobility outcomes. The between-group mean difference in NPRS improvement was 1.60 points, favoring the Graston Technique, while between-group differences in cervical range of motion ranged from 3.25 degrees for flexion and left lateral flexion to 7.45 degrees for right rotation. These results support rejection of the null hypothesis and indicate that, under the four-week protocol used in this trial, the Graston Technique produced greater short-term clinical improvement than Manual Soft Tissue Release.

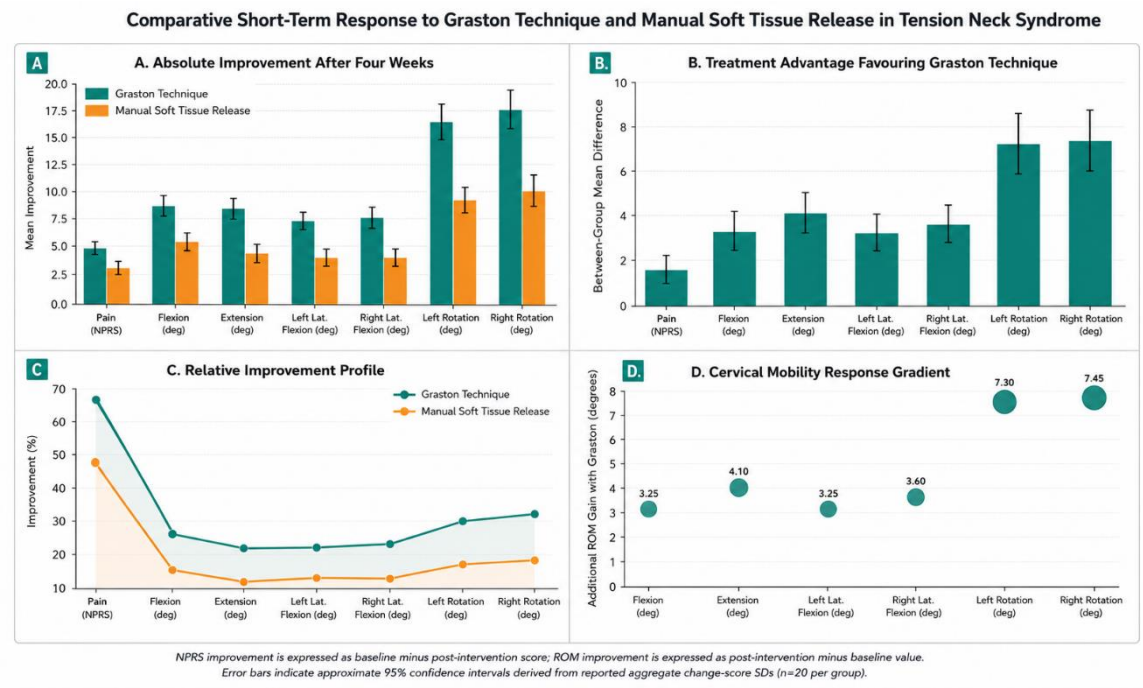

Figure 1 Short-term treatment advantage for the Graston Technique over Manual Soft Tissue Release across pain and cervical mobility outcomes

The panelled figure demonstrates a consistent short-term treatment advantage for the Graston Technique over Manual Soft Tissue Release across pain and cervical mobility outcomes. NPRS pain improved by 4.85 points in the Graston group compared with 3.25 points in the Manual Soft Tissue Release group, producing a between-group advantage of 1.60 points. Cervical ROM gains were also larger after Graston Technique across all six movement directions, with the smallest advantage observed for flexion and left lateral flexion (3.25° each) and the largest advantages observed for left and right rotation (7.30° and 7.45°, respectively). Relative improvement was greatest for pain reduction (67.4% vs 46.8%) and right cervical rotation (32.1% vs 18.4%), indicating that the Graston Technique produced broader and clinically meaningful improvement across both symptom severity and functional cervical mobility domains.

DISCUSSION

This randomized controlled trial compared the short-term effects of the Graston Technique and Manual Soft Tissue Release on pain intensity and cervical range of motion in patients with Tension Neck Syndrome. The principal finding was that both interventions produced statistically significant improvement after four weeks; however, the magnitude of improvement was consistently greater in the Graston Technique group. Pain intensity decreased by 4.85 points in the Graston Technique group compared with 3.25 points in the Manual Soft Tissue Release group, producing a between-group mean difference of 1.60 NPRS points in favor of the Graston Technique. Cervical mobility also improved in all measured directions in both groups, but between-group differences favored the Graston Technique

across flexion, extension, bilateral lateral flexion, and bilateral rotation. The largest additional gains were observed in cervical rotation, where the Graston Technique exceeded Manual Soft Tissue Release by 7.30° for left rotation and 7.45° for right rotation. These findings suggest that, under the four-week protocol used in this trial, the Graston Technique produced greater short-term improvement in both symptom severity and cervical mobility than Manual Soft Tissue Release.

The improvement observed in both groups is clinically plausible because both interventions targeted soft tissue restriction, myofascial tenderness, and reduced cervical mobility, which are central features of Tension Neck Syndrome. Manual Soft Tissue Release uses sustained pressure, myofascial release, longitudinal stretching, and trigger point techniques to reduce muscle tightness and improve tissue mobility. Previous literature supports the use of myofascial and manual soft tissue techniques for reducing pain and improving cervical mobility in patients with chronic neck pain and myofascial pain presentations (6,7). The 3.25-point reduction in NPRS pain score observed in the Manual Soft Tissue Release group indicates that the hands-on intervention was not merely a passive comparator but an active treatment with clinically meaningful benefit. This is important because Manual Soft Tissue Release is relatively low-cost, requires no specialized instruments, and may remain a practical intervention in rehabilitation settings where equipment access is limited.

The greater response in the Graston Technique group is consistent with previous reports describing beneficial effects of instrument-assisted soft tissue mobilization on pain and range of motion in musculoskeletal conditions (8–10). The Graston Technique may offer additional clinical advantages through instrument-mediated contact, broader tissue loading, and the ability to apply controlled mobilization strokes over restricted cervical and upper trapezius tissues. These mechanisms may contribute to improved tissue glide, mechanoreceptor stimulation, pain modulation, and short-term mobility gains, although the present study did not directly measure tissue remodeling, collagen alignment, local perfusion, inflammatory markers, or neuromodulatory responses. Therefore, mechanistic interpretation should remain cautious. The results support clinical effectiveness over four weeks but do not prove the biological mechanism through which the Graston Technique achieved superior improvement.

The pattern of cervical range of motion improvement provides further insight into treatment response. Rotation showed the largest absolute improvement in both groups, with right rotation increasing by 17.60° after the Graston Technique and 10.15° after Manual Soft Tissue Release. Left rotation showed a similar pattern, improving by 16.55° and 9.25°, respectively. This is clinically relevant because cervical rotation is essential for activities such as driving, turning the head during work tasks, and functional scanning of the environment. Smaller but consistent improvements were also observed in flexion, extension, and lateral flexion. The treatment advantage favoring the Graston Technique ranged from 3.25° to 7.45° across ROM outcomes, indicating a broad rather than isolated mobility effect. However, because the study did not include a disability index, functional performance scale, work-productivity measure, or quality-of-life instrument, the degree to which these ROM changes translated into daily functional improvement cannot be confirmed directly.

The between-group pain difference of 1.60 NPRS points is clinically meaningful because it reflects additional improvement beyond that achieved with Manual Soft Tissue Release, while both groups received identical adjunct physiotherapy. The relative improvement profile also favored the Graston Technique, with pain decreasing by 67.4% compared with 46.8% after Manual Soft Tissue Release. These findings suggest that the Graston Technique may be particularly useful when the clinical goal is rapid short-term reduction in pain combined with restoration of cervical movement. Nevertheless, treatment selection should not be based on statistical superiority alone. Patient tolerance, bruising risk, therapist training, availability of instruments, cost, patient preference, and the need for long-term maintenance should also be considered before recommending routine preference for one technique over another.

The findings should be interpreted in light of the study design and methodological safeguards. Random allocation and allocation concealment reduced selection bias, while blinded outcome assessment reduced detection bias. The equal session frequency, identical adjunct therapy, and standardized four-week intervention duration improved comparability between groups. Baseline demographic and clinical characteristics were statistically similar, strengthening confidence that post-intervention differences were related to the allocated interventions rather than baseline imbalance. The use of NPRS and bubble inclinometer measurements also provided clinically familiar and feasible outcome assessment tools for musculoskeletal rehabilitation research.

Several limitations must be acknowledged. First, the sample size was modest, with 20 participants in each group, which limits precision and reduces the ability to conduct reliable subgroup analyses by age, gender, symptom duration, occupational exposure, or baseline severity. Second, the follow-up period ended immediately after the four-week intervention, so durability of treatment effects remains unknown. Third, participant and therapist blinding was not possible because of the nature of the interventions, leaving potential for performance and expectation bias despite blinded assessment. Fourth, the study measured pain and cervical ROM but did not include disability, quality of life, psychological distress, patient satisfaction, analgesic use, or work-related outcomes. Fifth, multiple ROM outcomes were analyzed, and although the direction of effects was consistent, future trials should prespecify primary and secondary outcomes clearly and apply an appropriate strategy for multiple comparisons. Finally, as the study was conducted in a limited clinical setting in Lahore, the generalizability of findings to other populations, health-care systems, and longer-term rehabilitation pathways requires further investigation.

Future research should include larger multicenter randomized controlled trials with longer follow-up at three, six, and twelve months to determine whether the superior short-term response observed with the Graston Technique is sustained over time. Further studies should incorporate the Neck Disability Index, patient global rating of change, quality-of-life measures, adverse-event reporting, treatment satisfaction, and cost-effectiveness analysis. Mechanistic studies using imaging, tissue stiffness assessment, or other objective physiological measures may also clarify whether the observed clinical benefits are related to changes in soft tissue properties, pain modulation, or both. Until such evidence is available, the current results should be interpreted as supporting the short-term clinical advantage of the Graston Technique over Manual Soft Tissue Release for pain reduction and cervical ROM improvement in patients with Tension Neck Syndrome, rather than as definitive evidence of long-term superiority.

CONCLUSION

Both the Graston Technique and Manual Soft Tissue Release produced significant short-term reductions in pain and improvements in cervical range of motion among patients with Tension Neck Syndrome after a four-week physiotherapy protocol. However, the Graston Technique demonstrated greater improvement across the primary outcome of pain intensity and all measured cervical mobility outcomes, with the largest treatment advantages observed in left and right cervical rotation. These findings indicate that the Graston Technique may be a more effective short-term intervention than Manual Soft Tissue Release for improving pain and cervical mobility in this patient population, although larger trials with longer follow-up, functional outcomes, adverse-event monitoring, and cost-effectiveness evaluation are required before firm practice recommendations can be made.

ACKNOWLEDGEMENT

I am deeply grateful to Allah Almighty for granting me the strength, patience, and knowledge to complete this study. I sincerely thank Prof. Dr. Fahad Tanveer, Head of Department, and my supervisor, Dr. Komal Tehzeeb, for their valuable guidance, support, and encouragement throughout the research process. I also acknowledge the Department of Rehabilitation Sciences, Faculty of Medicine and Allied Health Sciences, Green International University, for academic support. Special thanks are extended to Dr. Iqbal Bhatti and the administration of Rafiq Bhatti Memorial Hospital, Shahdara, Lahore, for

facilitating data collection, and to all study participants for their cooperation. I am also thankful to my parents, family, and friends for their prayers and continuous support.

DEDICATION

To my beloved parents, whose prayers, sacrifices, and unwavering belief in me have been my greatest strength. To my family and friends, for their patience, encouragement, and support throughout this journey. To every patient who participated in this study, for trusting me and contributing to the advancement of rehabilitation sciences. This achievement is as much yours as mine.

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