International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Effect of Myofascial Release (Guasha) Over the Pectoral Muscles on Neck Pain, Saggital Shoulder Angle and Neck Disability in Subjects with Upper Cross Syndrome

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Abstract: ***Background: Upper Crossed Syndrome (UCS) is a postural dysfunction characterized by forward head posture, rounded shoulders, and muscular imbalance, and may be associated with neck pain and functional disability. Conventional physiotherapy is commonly used to address these impairments; however, evidence regarding the additional effect of Gua Sha over the pectoral muscles in individuals with UCS is limited. Aim: To determine the effect of myofascial release (Gua Sha) over the pectoral muscles on neck pain, sagittal shoulder angle, and Neck Disability Index in subjects with Upper Crossed Syndrome. Methods: Thirty female subjects aged 20–35 years who met the inclusion and exclusion criteria were randomly allocated to an experimental group (Group A, n=15) or a control group (Group B, n=15). Group A received Gua Sha over the pectoral muscles in addition to conventional physiotherapy, whereas Group B received conventional physiotherapy alone for 4 weeks. Pain was assessed using the Numeric Pain Rating Scale (NPRS), neck disability using the Neck Disability Index (NDI), and sagittal shoulder posture using digital photogrammetry. Results: Data were analyzed using IBM SPSS Statistics version 20. Both groups demonstrated statistically significant pre- to post-intervention improvements in NPRS, NDI, and SSA (p<0.001). Between-group comparisons of change scores demonstrated significantly greater improvement in Group A than Group B for NPRS, NDI, and SSA (p<0.001). Conclusion: Myofascial release using Gua Sha over the pectoral muscles, when combined with conventional physiotherapy, produced greater improvements in neck pain, sagittal shoulder alignment, and neck disability than conventional physiotherapy alone in women with Upper Crossed Syndrome.***

Keywords: Upper Crossed Syndrome, Gua Sha, Myofascial Release, Conventional Physiotherapy, Neck Pain, Sagittal Shoulder Angle, Neck Disability Index

1. Introduction

Upper Crossed Syndrome (UCS) is a postural dysfunction characterized by muscle imbalance involving tightness of the upper trapezius, levator scapulae, sternocleidomastoid, and pectoral muscles, along with weakness of the deep cervical flexors, middle and lower trapezius, rhomboids, and serratus anterior. It is commonly associated with forward head posture, rounded shoulders, increased thoracic kyphosis, and altered scapular alignment. Prolonged sitting, poor ergonomic practices, repetitive activities, and sustained faulty postures are important contributing factors. These muscular and postural alterations may lead to neck pain, restricted mobility, muscle fatigue, and functional disability Tightness of the pectoralis major and minor muscles contributes to anterior displacement of the shoulders, scapular protraction, and altered shoulder biomechanics. These changes may influence cervical muscle activity and contribute to neck pain and postural dysfunction.

Physiotherapy management of UCS commonly includes stretching of shortened muscles, strengthening of weakened muscles, and postural correction exercises. Myofascial release is an additional manual therapy approach used to address soft tissue restrictions and muscle tension. Gua Sha is an instrument-assisted technique involving repeated unidirectional strokes over lubricated skin, which may help reduce musculoskeletal pain and improve soft tissue mobility. Although conventional physiotherapy and corrective exercise programmes are commonly used in managing UCS, evidence regarding the additional benefits of Gua Sha specifically applied to the pectoral muscles

remains limited. Therefore, the present study aimed to evaluate the effect of myofascial release using Gua Sha over the pectoral muscles on neck pain, sagittal shoulder angle, and neck disability in individuals with Upper Crossed Syndrome.

Aim

- To know the effect of myofascial release (Gua Sha) over the pectoral muscles on neck pain, sagittal shoulder angle, neck disability in subjects with Upper Crossed Syndrome.

Objectives

- To evaluate the pre- and post-test test values of sagittal shoulder angle with digital photogrammetry in subjects with Upper Crossed Syndrome
- To evaluate the pre- and post-test test values of pain intensity with NPRS in subjects with Upper Crossed Syndrome
- To evaluate the pre and post-test values of neck disability with NDI questionnaire in subjects with Upper Crossed Syndrome
- To compare the post-test values of sagittal shoulder angle, NPRS, and NDI between the experimental and control groups.

2. Materials and Methodology

- Study design- randomized controlled experimental study
- Sample size- 30
- Study setting- College of Physiotherapy, SVIMS
- Study collection- College of Physiotherapy, SVIMS, BIRRD
- Treatment duration: 4 weeks
- Study period- 8 months
- Ethical approval: Approval was obtained from the Institutional Ethics Committee, Sri Venkateswara Institute of Medical Sciences, Tirupati (IEC No. 1878; approval dated 3 OCTOBER 2025). Written informed consent was obtained from every participant before enrolment.

Inclusion Criteria:

- Age: 20 to 35 years
- Gender: females
- Subjects with forward head posture and rounded shoulders
- Sagittal Shoulder Angle: greater than 20 degrees (normal 0-20 degrees)

Exclusion Criteria:

- Fractures of cervical spine, scapula and clavicle
- Degenerative conditions of spine
- Cervical rib
- Thoracic outlet syndrome
- Cervical Tumors
- Subjects with psychiatric disorders
- History of spinal surgery
- Cardiac Pacemakers
- Torticollis
- Scoliosis

Intervention Protocol

Pre-intervention:

All the following measurements were done, both in experimental and control groups before initiating any treatment protocol-

Neck pain was measured by NPRS scale

Sagittal shoulder angle was measured by digital photogrammetry.

Neck disability was measured by Neck Disability Index score [NDI]

Methodology:

GROUP A - Myofascial release + stretching + strengthening

GROUP B - stretching + strengthening

Participants allocated to Group A received a myofascial release by Gua Sha along with standardized conventional physiotherapy programme for 30–40 minutes per session, 3 sessions per week for 4 weeks.

Myofascial release by Gua Sha:

The participant was positioned in supine lying with the upper limbs comfortably abducted to expose the anterior chest wall. A small amount of massage lotion or emollient was applied over the pectoral region to reduce skin friction. The therapist first palpated the pectoralis major and pectoralis minor to identify areas of increased tissue tension and fascial restriction.

A smooth-edged stainless-steel Gua Sha instrument was held at an angle of approximately 30°–45° to the skin. Moderate, tolerable pressure was applied while performing slow unidirectional strokes from the sternal attachment towards the humeral insertion following the fibre orientation of the pectoralis major. Additional sweeping and fanning strokes were performed over the pectoralis minor from the coracoid process towards the upper ribs to release fascial adhesions and improve tissue extensibility. Each muscle was treated for 3–5 minutes, with the total Gua Sha intervention lasting 8–10 minutes.

3. Conventional Physiotherapy

Participants allocated to Group B received a standardized conventional physiotherapy programme for 30–40 minutes per session, 3 sessions per week for 4 weeks

Stretching Exercises

1) Pectoralis Major Stretch (Doorway Stretch) - The participant stood in an open doorway with both shoulders abducted to 90° and elbows flexed to 90°, placing the forearms against the door frame. The participant slowly stepped forward until a comfortable stretch was felt across the anterior chest. The stretch was maintained for 30 seconds and repeated 3 times.
2) Levator Scapulae Stretch - The participant sat upright and grasped the edge of the chair with the affected hand. The neck was flexed, rotated approximately 45° away from the affected side, and gently flexed forward until a stretch was felt over the posterior-lateral neck. The stretch was held for 30 seconds and repeated 3 times.
3) Upper Trapezius Stretch - The participant sat upright while the therapist stabilized the shoulder. The neck was gently side-flexed to the opposite side until a comfortable stretch was felt over the upper trapezius. The stretch was maintained for 30 seconds and repeated 3 times.
4) Sternocleidomastoid Stretch - The participant gently extended the cervical spine, side-flexed towards the involved side, and rotated the head to the opposite side

until a stretch was felt over the sternocleidomastoid muscle. The position was maintained for 30 seconds and repeated 3 times.

Strengthening Exercises

1) Chin Tuck (Deep Cervical Flexor Strengthening) - The participant stood against a wall with the head and shoulders supported. A gentle chin tuck was performed by drawing the chin backward without cervical flexion. The contraction was held for 5–10 seconds and repeated 10 times for 2 sets.
2) Scapular Retraction - The participant stood upright with a resistance band held in both hands, elbows flexed to 90°. The shoulder blades were squeezed together while gently pulling the band apart. The contraction was held for 6–10 seconds and repeated 10 times for 2 sets.
3) Shoulder External Rotation with Scapular Retraction - With the elbows flexed to 90° and held close to the trunk, the participant externally rotated both shoulders against resistance while simultaneously retracting the scapulae. Each contraction was maintained for 6–10 seconds and repeated 10 times for 2 sets.
4) Forward Punch (Serratus Anterior Strengthening) - The resistance band was wrapped around the participant's upper back while the ends were held in both hands. Keeping the elbows extended, the participant pushed both arms forward, allowing the scapulae to protract fully. The contraction was held for 6–10 seconds before returning slowly to the starting position. 10 repetitions were performed for 2 sets.
5) Dynamic Hug - The resistance band was positioned around the upper back. The participant abducted both shoulders to approximately 60° with elbows flexed to 45°, then brought both arms forward in a hugging motion against the resistance of the band until the hands approached each other. The movement was performed slowly and controled for 10 repetitions in 2 sets.

Statistical Analysis

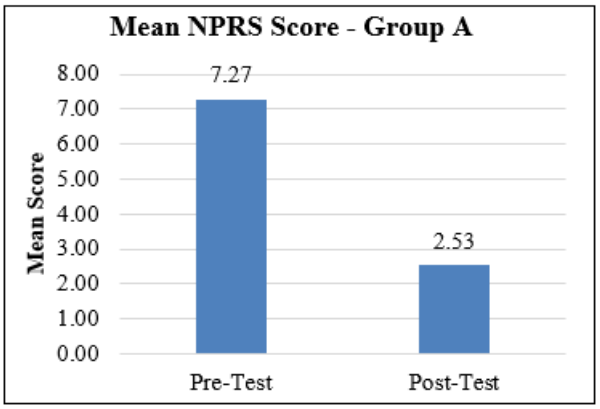
The statistical analysis of the collected data was performed using IBM SPSS Statistics Version 20. Descriptive and inferential statistical analyses were carried out using SPSS, while the tables and graphical representations of the results were prepared using Microsoft Excel for clear presentation and interpretation of the findings

4. Results

Thirty participants completed the four-week intervention, with 15 participants in each group. Mean age and BMI were 24.87 ± 2.00 years and 22.61 ± 0.98 kg/m² in Group A, and 24.33 ± 2.23 years and 22.84 ± 1.05 kg/m² in Group B.

Table 1: Shows pre- and post-test mean test values of NPRS among the subjects of experimental group

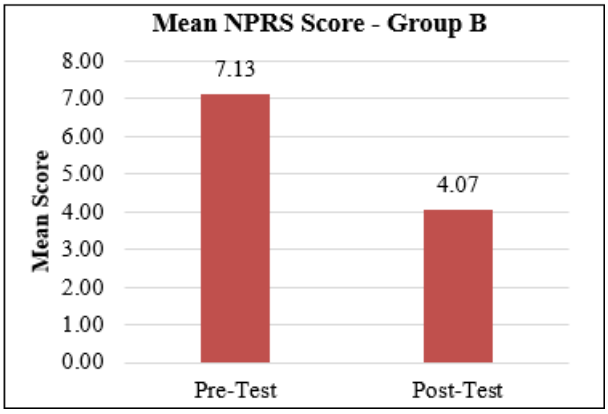
Paired-Samples t-test for NPRS Score - Group A				
	Pre-Test	Post-Test	t-stat	P-value
Mean	7.27	2.53	-20.74	0.000
SD	1.03	0.64		



Graph 1: Graphical representation of pre- and post-test values of NPRS within experimental group

Table 2: Shows pre- and post-test mean test values of NPRS among the subjects of control group

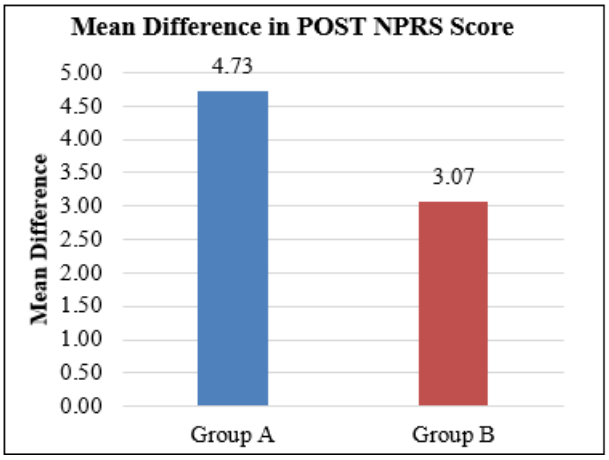
Paired-Samples t-test for NPRS Score - Group B				
	Pre-Test	Post-Test	t-stat	P-value
Mean	7.13	4.07		
SD	1.06	0.88		



Graph 2: Graphical representation of pre- and post-test values of NPRS within group of control group

Table 3: Shows comparison of mean change scores of NPRS among the subjects of experimental group and control group

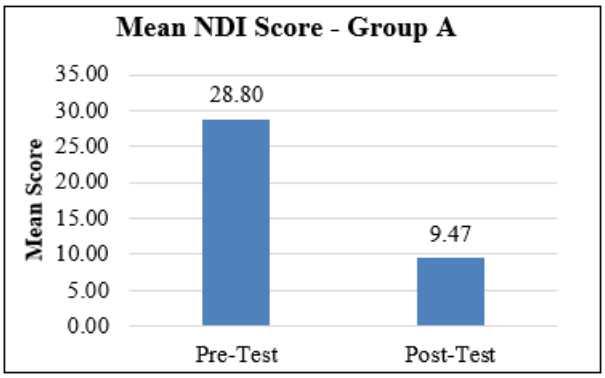
Independent Samples t-test for Difference in NPRS Score				
	Group A	Group B	t-stat	P-value
Mean	-4.73	-3.07		
SD	0.88	0.88		



Graph 3: Graphical representation of post values of NPRS in between group A and group B

Table 4: Shows pre- and post-test mean test values of NDI among the subjects of experimental group

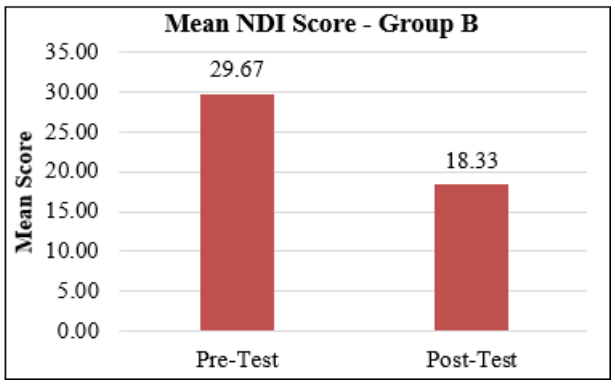
Paired-Samples t-test for NDI Score - Group A				
	Pre-Test	Post-Test	t-stat	P-value
Mean	28.80	9.47		
SD	2.93	1.96		



Graph 4: Graphical representation of pre- and post-test values of NDI among the subjects of experimental group

Table 5: Shows pre- and post-test mean test values of NDI among the subjects of control group

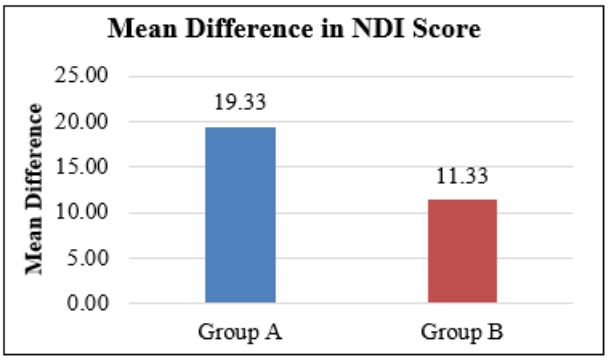
Paired-Samples t-test for NDI Score - Group B				
	Pre-Test	Post-Test	t-stat	P-value
Mean	29.67	18.33		
SD	2.87	2.13		



Graph 5: Graphical representation of pre- and post-test values of NDI within group of control group

Table 6: Shows comparison of mean change scores of NDI among the subjects of experimental group and control group

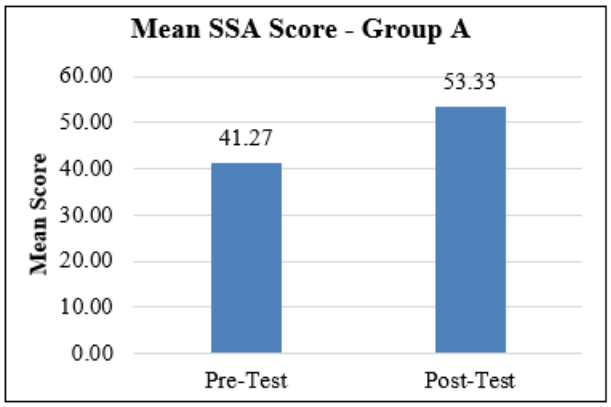
Independent Samples t-test for Difference in NDI Score				
	Pre-Test	Post-Test	t-stat	P-value
Mean	-19.33	-11.33		
SD	1.29	0.90		



Graph 6: Graphical representation of post values of NDI in between group A and group B

Table 7: Shows pre- and post-test mean test values of SSA among the subjects of experimental group

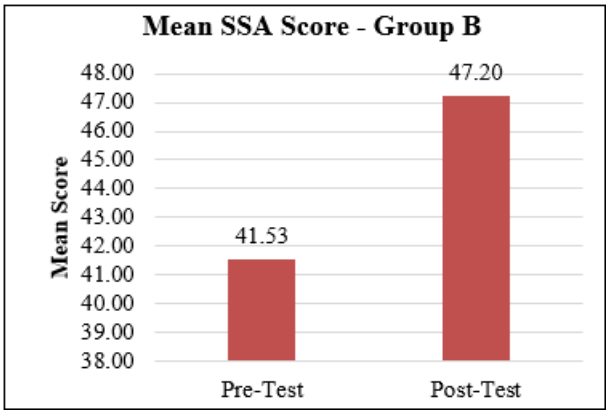
Paired-Samples t-test for SSA Score - Group A				
	Pre-Test	Post-Test	t-stat	P-value
Mean	41.27	53.33		
SD	1.49	1.54		



Graph 7: Graphical representation of pre- and post-test values of SSA within group of experimental group

Table 8: Shows pre- and post-test mean test values of SSA among the subjects of control group

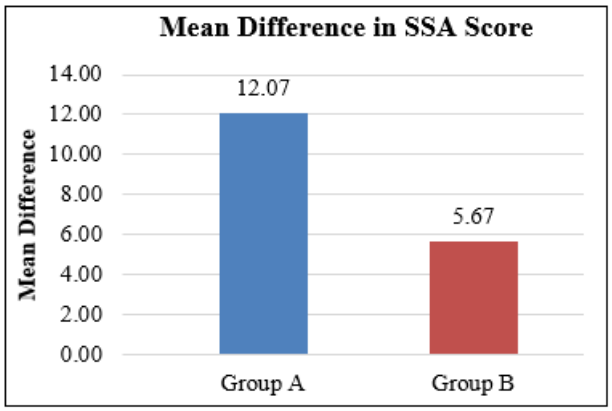
Paired-Samples t-test for SSA Score - Group B				
	Group A	Group B	t-stat	P-value
Mean	41.53	47.20		
SD	1.41	1.37		



Graph 8: Graphical representation of pre- and post-test values of SSA within group of control group

Table 9: Shows comparison of mean change scores of SSA among the subjects of experimental group and control group

Independent Samples t-test for Difference in SSA Score				
	Group A	Group B	t-stat	P-value
Mean	12.07	5.67		
SD	0.26	0.82		



Graph 9: Graphical representation of post values of SSA in between group A and group B

5. Discussion

The present study found significant improvements in neck pain, neck disability and sagittal shoulder alignment in both groups following four weeks of treatment. However, the group receiving Gua Sha in addition to conventional physiotherapy demonstrated greater improvements across all three outcomes.

The greater reduction in NPRS in Group A may be related to the effects of instrument-assisted soft tissue treatment on pectoral soft tissue tension and pain sensitivity. The findings are consistent with the randomized trial by Braun et al., which reported benefits of Gua Sha in chronic neck pain, and the study by Lauche et al., which observed changes in pain intensity and pressure pain thresholds following Gua Sha

The greater improvement in SSA in Group A may reflect reduced pectoral tightness and improved scapular positioning. Borstad and Ludewig reported that pectoralis minor resting length influences scapular kinematics, supporting the relevance of addressing pectoral muscle restrictions in rounded shoulder posture [3]. The reduction in NDI may be associated with the combined improvement in pain, posture and functional movement.

The superior outcomes observed in the experimental group indicate that Gua Sha provides additional clinical benefits when combined with conventional physiotherapy. Conventional exercises primarily restore muscle strength, flexibility, postural awareness, and neuromuscular control. However, Gua Sha specifically addresses fascial restrictions and soft tissue tightness that may limit the effectiveness of exercise alone.Mechanical stimulation produced by Gua Sha increases local microcirculation, promotes fascial gliding, reduces muscle stiffness, and enhances tissue extensibility. Reduction of pectoralis muscle tightness permits more normal scapular positioning, decreases abnormal loading on the cervical spine, and facilitates efficient activation of the deep cervical flexors and scapular stabilizers during exercise. Consequently, the combination of manual therapy and exercise produces greater improvements than exercise alone.These findings are consistent with Mittal and Sharma (2024), who concluded that myofascial release is most effective when integrated with conventional physiotherapy. Khan et al. (2025) also reported improved soft tissue mobility and functional outcomes following myofascial release interventions

As both groups received stretching and strengthening exercises, the additional improvement in Group A suggests a possible adjunctive benefit of Gua Sha within the treatment programme.

6. Limitations and Recommendations

1) The sample size was small (15 participants per group), which limits the generalizability of the findings.
2) No long-term follow-up was performed; therefore, the durability of the treatment effects could not be determined.
3) Only female participants aged 20–35 years were included, limiting generalizability to other age groups and males.

7. Future Recommendations

1) Future studies should include larger sample sizes and, where feasible, multicenter recruitment.
2) Future studies should include longer-term follow-up to determine the persistence of treatment effects.
3) Future studies should include participants of different age groups and both sexes.

8. Conclusion

The present study concluded that participants who received Gua Sha over the pectoral muscles in addition to conventional physiotherapy demonstrated greater improvements in neck pain, sagittal shoulder angle, and neck disability than participants who received conventional physiotherapy alone. Therefore, the findings support the use of Gua Sha as an adjunct to conventional physiotherapy for the outcomes assessed in this study. The alternate hypothesis was accepted and the null hypothesis was rejected based on the statistically significant between-group findings.

Declarations

Ethics approval and consent:
Institutional Ethics Committee, SVIMS, IEC No. 1878, approved 3 OCTOBER 2025. Written informed consent was obtained from all participants.

Funding:
No external funding was reported. Competing interests: The authors declare no competing interests. Data availability: Data are available from the corresponding author on reasonable request, subject to institutional requirements.

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