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Comparative Effects of Integrated Neuromuscular Inhibitory Technique Combined with Surged Faradic Current Versus Manual Trigger Point Release in Chronic Upper Trapezius Myofascial Pain: A Randomized Controlled Trial

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Abstract: ***Background of the study:*** *Chronic upper trapezius pain is associated with pain, reduced cervical mobility, and functional limitation. Comparative evidence for combined manual and electrotherapeutic interventions remains limited.* ***Aim:*** *To compare the effects of integrated neuromuscular inhibitory technique combined with surged faradic current versus manual trigger point release on pain, cervical range of motion, and disability in adults with chronic upper trapezius pain.* ***Objective:*** *1) To examine the efficacy of Integrated neuromuscular inhibitory technique with surged faradic current v/s manual trigger point release technique on pain in patients with chronic upper trapezius myofascial pain. 2) To examine the efficacy of Integrated neuromuscular inhibitory technique with surged faradic current v/s manual trigger point release technique on cervical range of motion in patients with chronic upper trapezius myofascial pain. 3) To examine the efficacy of Integrated neuromuscular inhibitory technique with surged faradic current v/s manual trigger point release technique on functional disability in patients with chronic upper trapezius myofascial pain.* ***Methodology:*** *Fifty-six participants were randomized into two groups (n=28 each). Group A received INIT plus surged faradic current, and Group B received manual trigger point release. Both groups also received conventional care. Outcomes included VAS, NDI, and cervical ROM before and after 4 weeks. Appropriate within-group and between-group statistical analyses were performed.* ***Results:*** *Both groups improved significantly after treatment. Group A demonstrated greater improvements in pain, disability, and cervical ROM compared with Group B (p less than 0.001).* ***Conclusion:*** *INIT combined with surged faradic current may provide greater short-term benefit than manual trigger point release in this study population. Larger rigorously designed trials are needed.*

Keywords: Upper trapezius pain; Myofascial trigger point; Integrated neuromuscular inhibitory technique; Manual trigger point release; Surged faradic current; Neck disability index; Cervical range of motion; Randomized controlled trial.

1. Introduction

Trapezitis or Trapezius Myofascial Pain is a musculoskeletal condition characterized by inflammation of the trapezius muscle, commonly involving the upper fibres, and is associated with pain, muscle spasm, and restriction of cervical movements [2]. The trapezius muscle is a large postural muscle extending from the occipital region to the thoracic spine and shoulder, and due to its role in maintaining posture, it is highly susceptible to overuse and fatigue [3,1].

Trapezitis commonly develops due to faulty posture, prolonged sitting, repetitive activities, and poor ergonomics, especially among individuals involved in desk work and computer-related activities. Muscle spasm occurring due to untreated strain may lead to the formation of myofascial trigger points, which are hyperirritable spots in a taut band of skeletal muscle producing localized and referred pain [6].

Trapezitis is characterized by a variety of symptoms that significantly affect an individual's quality of life. Common symptoms include localized neck and shoulder pain, tenderness, stiffness, reduced cervical range of motion, and pain that may radiate to surrounding areas. The pain may be present even at rest and is often aggravated by activity or prolonged static postures [4]. The pathophysiology of trapezitis involves muscle overloading and microtrauma leading to localized ischemia, reduced oxygen supply, and accumulation of metabolic waste products. This results in the development of myofascial trigger points, causing pain, muscle tightness, and restricted movement. Over time, these changes may lead to adaptive shortening of muscle fibre, reduced flexibility, and impaired neuromuscular control. The presence of trigger points also alters normal muscle function and contributes to chronic pain and disability [6].

Management of trapezitis aims to reduce pain, relieve muscle spasm, improve range of motion, and restore normal function. Physiotherapy plays a major role in its management, including interventions such as stretching exercises, electrotherapy, manual therapy, and trigger point release techniques. Various studies have shown that techniques like deep transverse friction massage, ischemic compression, and conventional therapy are effective in reducing pain and improving cervical mobility [5,7,8].

2. Methodology

Study design: Use Randomized Controlled Trial)

Blinding: Single Blinded study

Study area: Physiotherapy department of Narayana orthopaedic spine and trauma centre, Narayana health city, Bengaluru.

Study Duration: 3 months

Study population: Patients with chronic upper trapezius myofascial pain.

Sampling: Simple random Sampling

Randomization: Randomizing patients into treatment groups was done to prevent researchers, clinicians, and patients from predicting and, thus, influencing which patients will receive which treatment technique. This important source of bias was eliminated by concealing the upcoming allocation sequence from researchers and participants. The sequentially numbered, opaque, sealed envelope (SNOSE) is effective. To ensure allocation concealment, the patients and the research unit were unaware of the allocation sequence before recruitment. Treatment allocation was revealed only after patients had been allocated.

Concealment: Concealment of allocation was done as the participant entered the trial. Concealment secures randomization and prevents "selection bias." To avoid bias, the following allocation of concealment technique was used: Sequentially numbered, opaque, **Sealed envelope (SNOSE) technique:** the randomization group was written on a paper and was kept in an opaque, sealed envelope. The envelope was labelled with a serial number. The investigator opened the sealed envelope once the patient had consented to participate and then assigned the treatment group accordingly

Diagnostic Criteria: Patient having complain of upper back or shoulder region pain, pain least last for one-month, palpable tender spot/ band, limited neck movement.

Sample size (with justification): Total sample size = 56

According to the study by **Pathan et al., (2021)** the mean and standard deviation of cervical extension pain between group A (positional release therapy) and group B (manual trigger point release) are 3.0±1.4 and 2.0±1.6. Expecting a similar difference, the sample size was calculated with a 90% confidence interval and 80% power.[1]

$$n \geq \frac{\left(z_{\frac{1-\alpha}{2}} + z_{1-\beta}\right)^2 \left(\frac{\sigma_1^2 + \sigma_2^2}{r}\right)}{(\mu_1 - \mu_2)^2}$$

Type I error (α) = 0.1
Type II error (β) = 0.2
Mean in group A = 3.0
Standard deviation in group A = 1.4
Mean in group B = 2.0
standard deviation in group B = 1.6
Ratio of group A to B = 1

Minimum sample size needed in group A = 28

Minimum sample size needed in group B = 28

Eligibility Criteria and Participants recruitment procedure:

Inclusion Criteria:
- Palpable tender spot over the upper trapezius muscle
- Patients having complaint of upper back pain.
- Limited neck movement.
- Age between 18 to 35 years.
- Pain from at least last 1 month.
- Willing to participate [3]

Exclusion Criteria:
- Any kind of cervical injury.
- Open wound. (around the shoulder and neck)
- Recent or unstable fracture over the cervical spine.
- Degenerative changes on the cervical spine
- Any paresthesia sensation on upper limb.
- In-cooperative patient
- Patient below 18 years or above 35 years [3]

3. Procedure:

The subjects who fulfilled the inclusion criteria and were willing to participate in the study were recruited after obtaining written informed consent. A total of 56 patients with chronic upper trapezius myofascial pain were included and randomly allocated into two groups.

Group A was treated with Integrated Neuromuscular Inhibitory Technique along with Surged Faradic Current.
- Three sessions per week for one month. INIT consists of 3 techniques, those are Ischemic Compression, Strain Counter Stain technique and Muscle Energy Technique.
- Ischemic compression, therapist would place thumb over the active trigger points and would slowly increase the pressure until the tissue resistance barrier is felt. The pressure was maintained until the release of tissue resistance barrier is felt then release the pressure. Continue this process like 30 sec compression and 2-3 sec release until palpable tissue changes are noted.
- Strain Counter Strain Technique, Patient was in supine position then pressure applied over painful point, the patient was instructed to perform shoulder abduction at a range where the pain was reduced. That position was maintained for 30 sec and repeat that process 3 times.
- Muscle Energy Technique, here the Lewit's post isometric relaxation technique was approaching. The one hand of therapist would use for stabilizing the shoulder on affected side and other hand on the ear/ mastoid process of affected side, then the therapist would provide contralateral lateral flexion, cervical flexion and ipsilateral rotation till the restriction. Then the patient would shrug the shoulder towards the ear at that time the isometric effort will give for 7 to 10sec. To advance the technique 30 sec stretch given at the end of each rotation. 3 to 5 repetition per session.
- Surged Faradic Current, patient was in relaxed prone position, treated area was cleaned, Frequency 50Hz and pulsed duration 0.1 to 1 microsecond, duration of treatment 10 min.

- Gold standard of treatment was given. (hot pack, stretching).[3]

Group B received Manual Trigger Point Release Technique. Both interventions will be administered for a duration of 4 weeks as per the study protocol.

- The treatment was given for three sessions per week for one month.
- Manual Trigger point release, first the therapist would identify the trigger point by pincer palpation method then the therapist would apply five slow and sufficient pressure (moderate but tolerable) on trigger point, the holding time was until the trigger point softens (max 60 sec), loss of referred pain. 10 sec hold for each before each episode.
- Gold standard treatment was given. (hot pack, stretching) [1]

Baseline assessment of outcome measures including Visual Analogue Scale (VAS), Neck Disability Index (NDI), and Cervical Range of Motion (CROM) will be recorded prior to the intervention. Post-treatment assessments will be carried out following the completion of the intervention period to evaluate the effectiveness of the treatment.

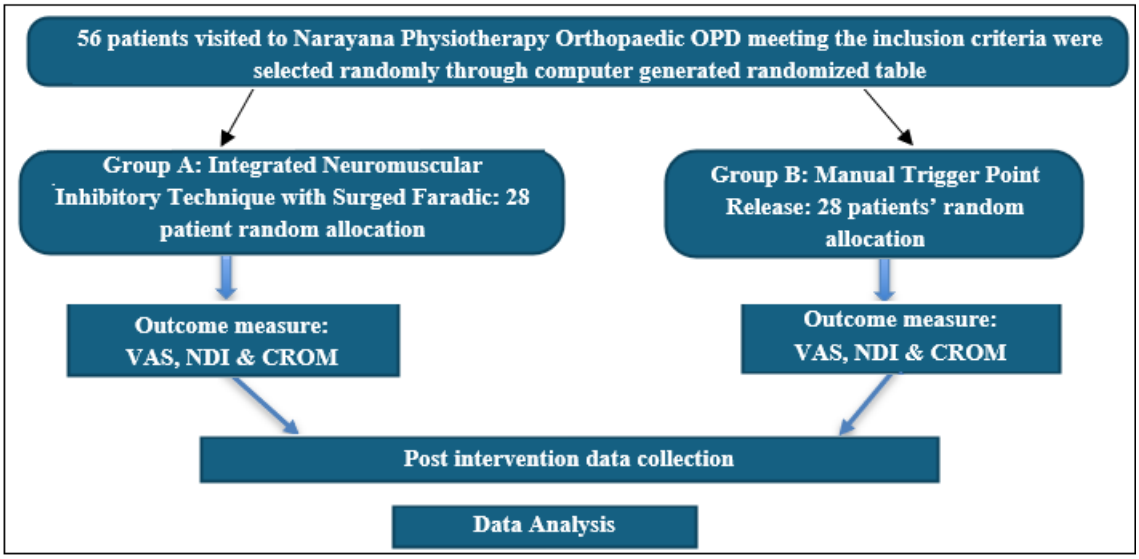
Ethical Clearance/ Consideration:

- Ethical clearance was obtained from Narayana Health Academic Ethics Committee, **No. NHH/AEC-CL-2025-1517** prior to the study from the ethics committee of the institution.
- **Informed consent was obtained from patients before the onset of study.**
- The subjects were informed that their participation was on voluntary basis and they can withdraw from the study at any time.
- No Ethical issue arose during the study.

Statistical analysis Rationale:

Was performed using SPSS version 25. Data normality was assessed using the Shapiro–Wilk test. To compare pre-operative and post-operative outcome measures (VAS, NDI, Cervical Range of Motion). within the groups, Wilcoxon signed-rank test and Mann–Whitney U test was used. A p-value <0.05 was considered statistically significant.

Flow of Participation:

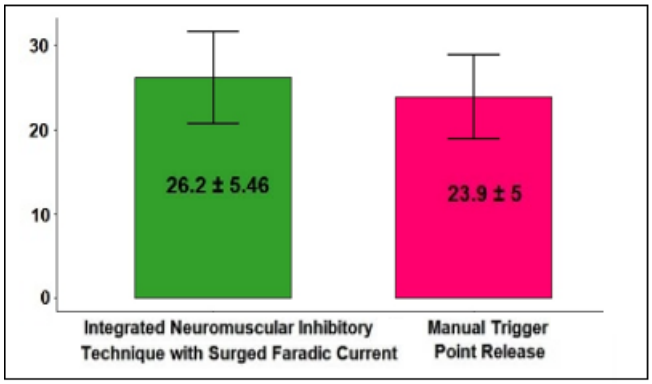


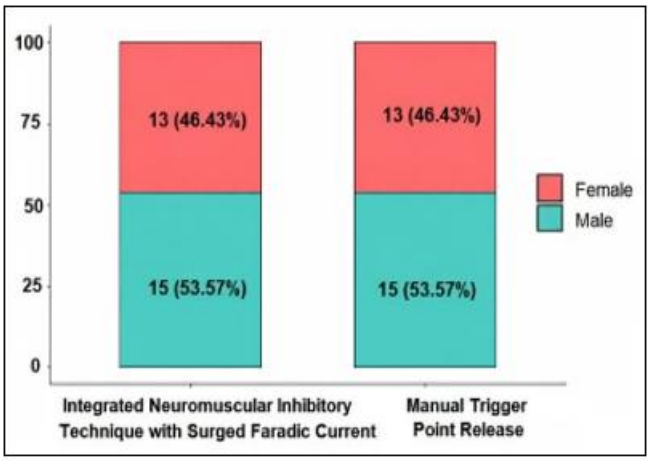
Data Analysis

The pre-test and post-test values were analysed and the data were entered in Microsoft Word 2011 and analysed by SPSS 27. Shapiro -Wilk Test was used for the Normality Test. For within the group Wilcoxon Signed Rank Test was used and for between the groups comparison Mann-Whitney U test was used for statistical analysis.

Table 1: Demographic/ Demographic Statistics

Parameter	Group A (n=28)	Group B (n=28)
Gender		
Female	13 (46.43)	13 (46.43)
Male	15 (53.57)	15 (53.57)
Age	26.2 ± 5.46	23.9 ± 5





Graph 1 & 2: Gender & Age Distribution Graph

Both groups showed comparable baseline characteristics. Male participants predominated in both Group A (53.57%) and Group B (53.57%). Female participants constituted 46.43% in both groups. The mean age was 26.2 ± 5.46 years in Group A and 23.9 ± 5 years in Group B. Overall, both groups were well matched in terms of age and gender distribution.

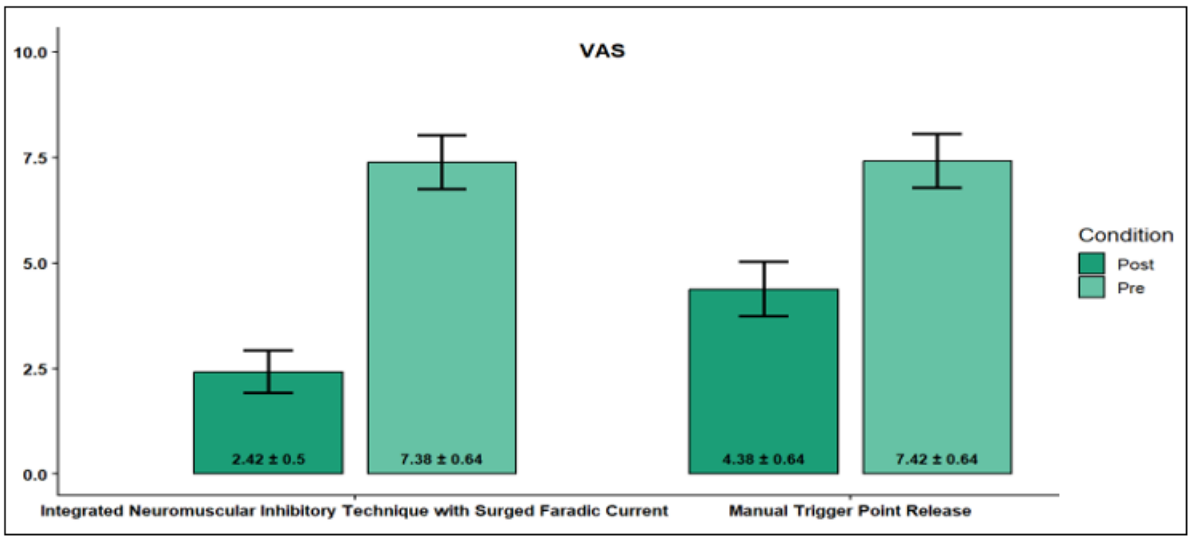
Wilcoxon Signed Rank Test: Within Group Comparison of Group A Table-2:

Parameter	Pre Test (Mean ± SD)	Post Test (Mean ± SD)	Mean Diff	SD Diff	P value
VAS	7.38 ± 0.64	2.42 ± 0.50	-4.96	0.60	<0.001*
NDI	13.69 ± 1.26	7.15 ± 1.01	-6.54	1.07	<0.001*
Flexion	51.46 ± 1.58	62.19 ± 1.42	10.73	0.92	<0.001*
Extension	54.12 ± 0.99	61.46 ± 1.42	7.35	0.94	<0.001*
Rotation (Right)	58.12 ± 1.21	65.54 ± 1.56	7.42	0.95	<0.001*
Rotation (Left)	58.19 ± 1.17	65.27 ± 1.25	7.08	0.63	<0.001*
Lateral Flexion (Right)	28.62 ± 0.98	42.85 ± 1.32	14.23	0.95	<0.001*
Lateral Flexion (Left)	28.65 ± 1.02	42.65 ± 1.33	14.00	1.02	<0.001*

Wilcoxon Signed Rank Test: Within Group Comparison of Group B Table 3:

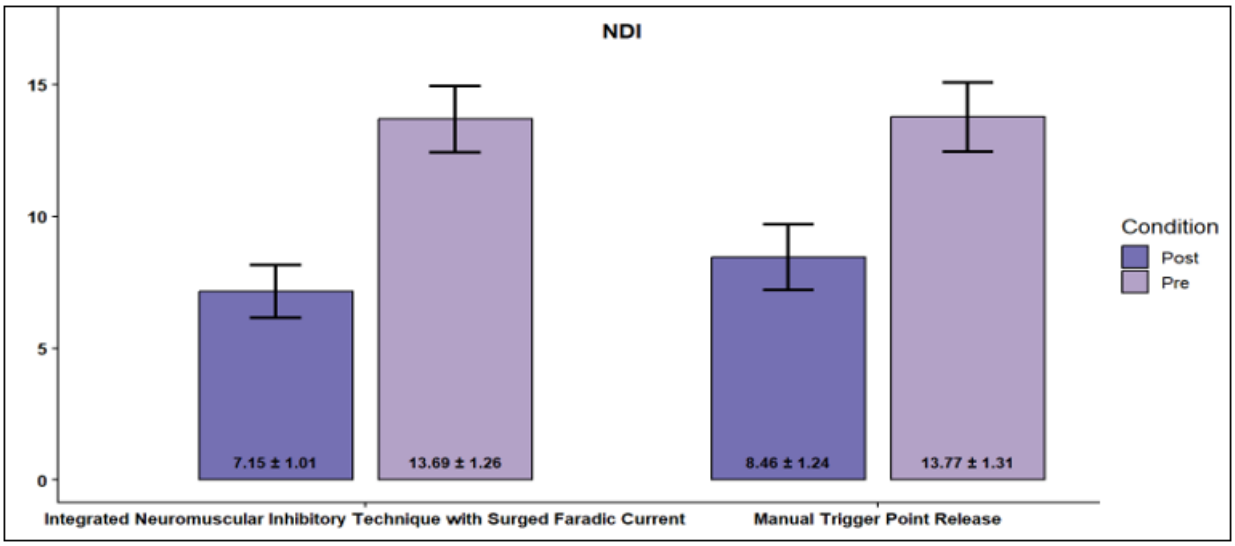
Parameter	Pre Test (Mean ± SD)	Post Test (Mean ± SD)	Mean Diff	SD Diff	P value
VAS	7.42 ± 0.64	4.38 ± 0.64	-3.04	0.45	<0.001*
NDI	13.77 ± 1.31	8.46 ± 1.24	-5.31	0.68	<0.001*
Flexion	51.31 ± 1.62	58.00 ± 1.50	6.69	0.68	<0.001*
Extension	54.08 ± 0.94	59.19 ± 1.20	5.12	0.71	<0.001*
Rotation (Right)	57.85 ± 1.08	63.12 ± 1.31	5.27	0.72	<0.001*
Rotation (Left)	57.88 ± 0.99	62.92 ± 1.55	5.04	0.96	<0.001*
Lateral Flexion (Right)	28.77 ± 0.86	37.81 ± 1.30	9.04	0.72	<0.001*
Lateral Flexion (Left)	28.54 ± 1.10	37.58 ± 1.94	9.04	1.95	<0.001*

Values are presented as Mean ± Standard Deviation (SD). Mean Diff represents (Post − Pre); Statistical Test: Wilcoxon Signed Rank Test; P value <0.05 – Significant.



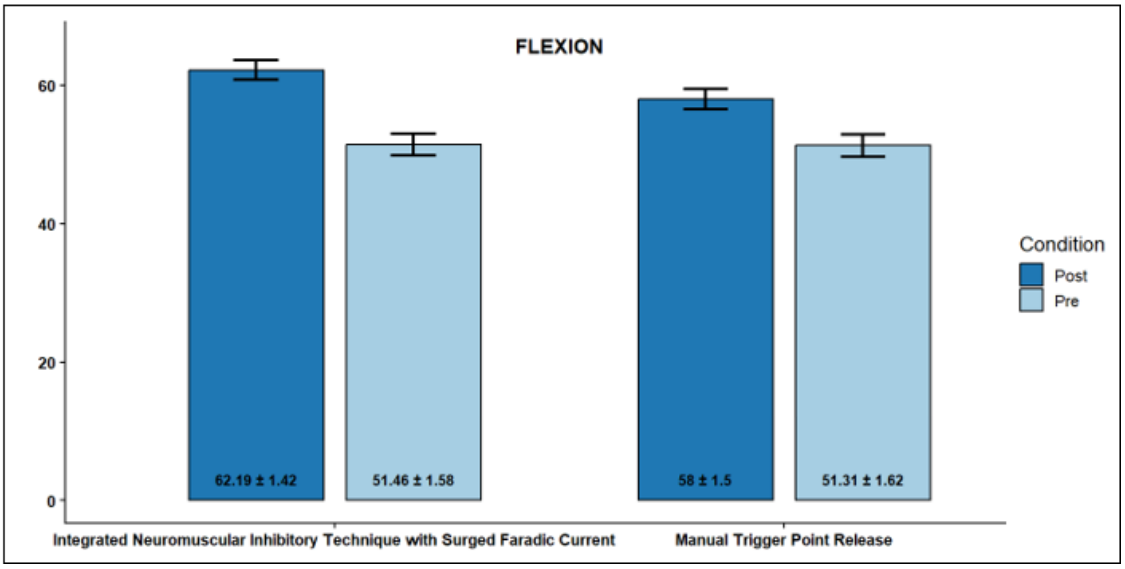
Graph 3: Comparison of Pre- test and Post- test VAS of Group A & Group B

The VAS showed improvement from pre-test to post-test in both groups. In Group B, the mean value increased from 4.38 ± 0.64 to 7.42 ± 0.64 with a mean difference of 3.04. However, in Group A the change was higher from a pre-test value of 2.42 ± 0.5 to a post-test value of 7.38 ± 0.64 with a mean difference of 4.96



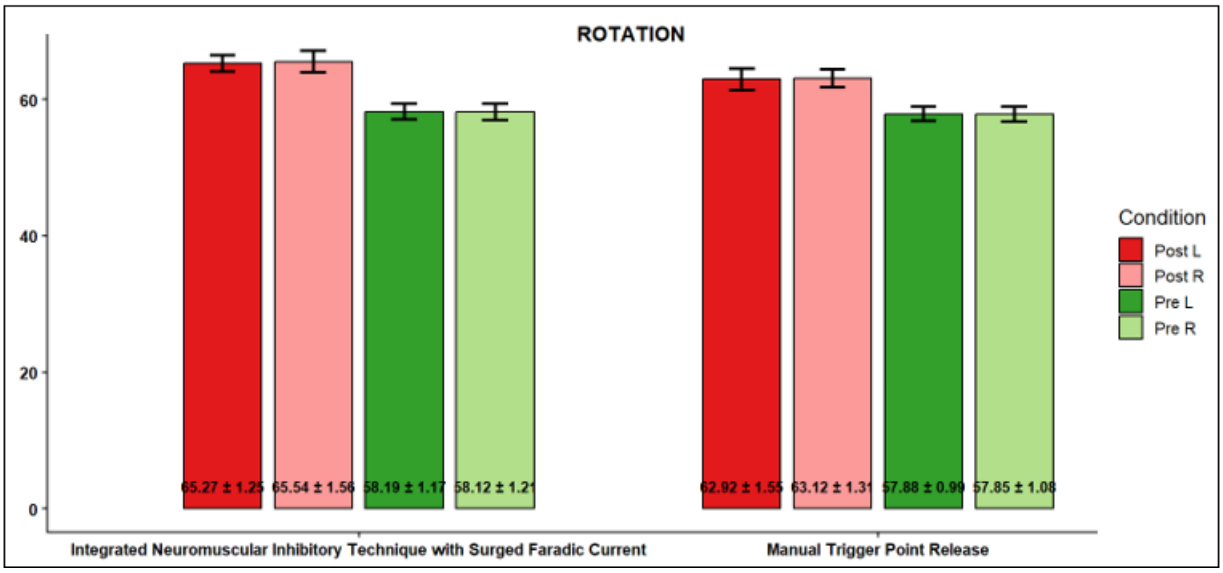
Graph 4: Comparison of Pre- test and Post- test NDI of Group A & Group B

The NDI showed improvement from pre-test to post-test in both groups. In Group B, the mean value decreased from 13.77 ± 1.31 to 8.46 ± 1.24 with a mean difference of **5.31**. However, in Group A the change was higher from a pre-test value of 13.69 ± 1.26 to a post-test value of 7.15 ± 1.01 with a mean difference of **6.54**.



Graph 5: Comparison of Pre- test and Post- test Cervical flexion of Group A & Group B

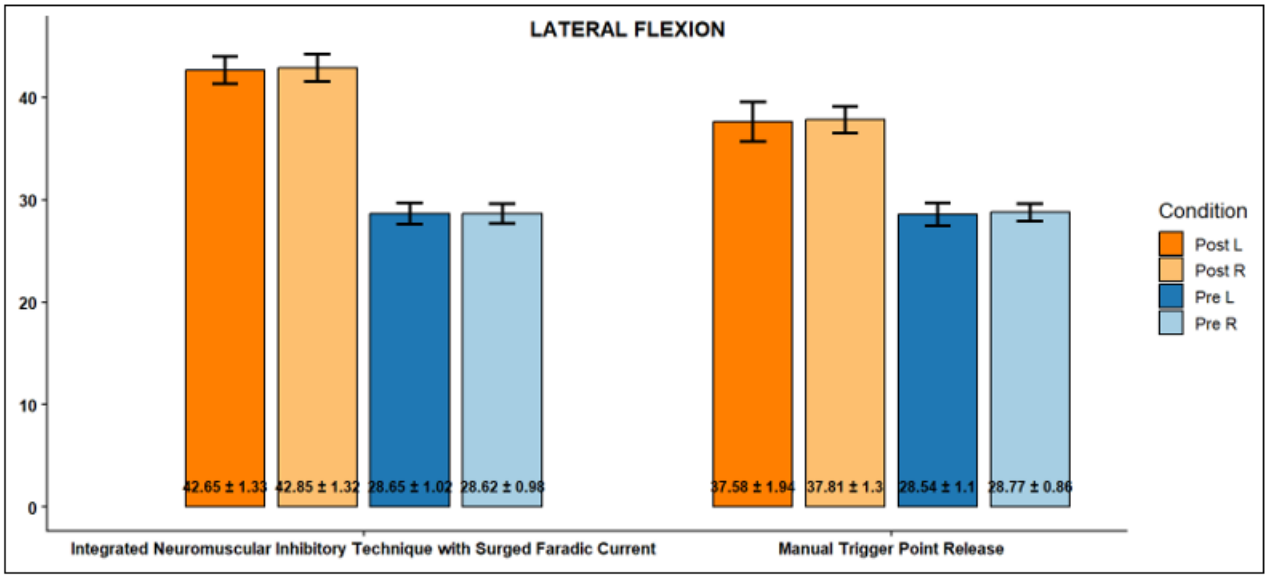
The flexion range of motion showed improvement from pre-test to post-test in both groups. In the Manual Trigger Point Release group, the mean value increased from 51.31 ± 1.62 to 58 ± 1.50 with a mean difference of **6.69**. However, in the Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current group, the improvement was higher, with values increasing from 51.46 ± 1.58 to 62.19 ± 1.42, showing a mean difference of **10.73**



Graph 6: Comparison of Pre- test and Post- test Cervical Rotation of Group A & Group B

The left rotation range of motion showed improvement from pre-test to post-test in both groups. In the Manual Trigger Point Release (group B), the mean value increased from 57.88 ± 0.99 to 62.92 ± 1.55 with a mean difference of **5.04**. However, in the Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current (group A), the improvement was higher, with values increasing from 58.19 ± 1.17 to 65.27 ± 1.25, showing a mean difference of **7.08**.

The right rotation range of motion also demonstrated improvement from pre-test to post-test in both groups. In the Manual Trigger Point Release (group B), the mean value increased from 57.85 ± 1.08 to 63.12 ± 1.31 with a mean difference of **5.27**. In comparison, the Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current (group A) showed a greater improvement, with values rising from 58.12 ± 1.21 to 65.54 ± 1.56, resulting in a mean difference of **7.42**.



Graph 7: Comparison of Pre- test and Post- test Cervical Lateral Flexion of Group A & Group B

The left lateral flexion range of motion showed improvement from pre-test to post-test in both groups. In the Manual Trigger Point Release (group B), the mean value increased from 28.54 ± 1.10 to 37.58 ± 1.94 with a mean difference of **9.04**. However, in the Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current (group A), the improvement was higher, with values increasing from 28.65 ± 1.02 to 42.65 ± 1.33, showing a mean difference of **14.00**.

The right lateral flexion range of motion also demonstrated improvement from pre-test to post-test in both groups. In the Manual Trigger Point Release (group B), the mean value increased from 28.77 ± 0.86 to 37.81 ± 1.30 with a mean difference of **9.04**. In comparison, the Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current (group A) showed a greater improvement, with values rising from 28.62 ± 0.98 to 42.85 ± 1.32, resulting in a mean difference of **14.23**.

4. Results

This interventional study was conducted to analyze the effect of of Integrated neuromuscular inhibitory technique with surged faradic current and manual trigger point release

technique in patients with chronic upper trapezius myofascial pain.

A total of 56 Patients were taken in the study. They were selected by Simple random sampling method and assigned into two groups. Group A (Integrated Neuromuscular Inhibitory technique with Surged Faradic Current) consisted of 28 patients and Group B (Manual Trigger Point Release) consisted of 28 patients.

Table 2

- Within-group analysis of Group A demonstrated statistically significant improvements in all outcome measures following the intervention ($p < 0.001$). The mean VAS score significantly decreased from 7.38 ± 0.64 to 2.42 ± 0.50.
- Similarly, the NDI score showed a significant reduction from 13.69 ± 1.26 to 7.15 ± 1.01, indicating improvement in functional disability.
- Cervical range of motion also improved significantly, with increases observed in flexion (51.46 ± 1.58 to 62.19 ± 1.42), extension (54.12 ± 0.99 to 61.46 ± 1.42), bilateral rotation, and bilateral lateral flexion ($p < 0.001$), **Group A was effective in reducing pain and disability while improving range of motion**.

Table 3

- Within-group analysis of Group B demonstrated statistically significant improvements in all outcome measures following the intervention ($p < 0.001$). The mean VAS score decreased from 7.42 ± 0.64 to 4.38 ± 0.64, while the NDI score reduced from 13.77 ± 1.31 to 8.46 ± 1.24.
- Cervical range of motion, including flexion, extension, rotation, and lateral flexion, also showed significant improvement ($p < 0.001$). However, the magnitude of improvement in Group B was less compared to Group A.
- Overall, the findings indicate that both interventions were effective; however, **Integrated Neuromuscular Inhibitory Technique combined with surged faradic current was more effective than manual trigger point release in reducing pain (VAS), improving functional disability (NDI), and enhancing cervical range of motion.**

5. Discussion

The results of the current study show that there is a significant reduction of pain and improvement in functional disability and cervical range of motion in INIT than MTpR. **Sibby et al.,** reported that both INIT combined with stretching and laser therapy are equally effective in managing neck pain due to upper trapezius trigger points. Pain reduction in the INIT group may be due to mechanoreceptor stimulation, which activates the pain gate mechanism, along with improved circulation after trigger point release. They also observed improvement in cervical range of motion, likely due to techniques like PRT and MET that reduce muscle spasm through post-isometric relaxation (via Golgi tendon organ activation). Additionally, neck disability scores showed significant improvement following INIT. [9]

Gayathri et al., the statistical analysis presented the frequency of the number of participants in the form of percentage which shows that, out of 165 participants who took part in the study. 58 participants (35.2% of the participants) were male and 64.8% of the participants, i.e., 107 participants in the study were female, which shows that more than half of the participants were female. But in my study, it shows that 53.57% of male and 46.43% of female [10].

Shetty et al., VAS score in the surged faradic current group reduced from ~7.1 ± 0.8 to ~3.2 ± 0.7, whereas in the manual pressure release group it reduced from ~7.0 ± 0.9 to ~4.1 ± 0.8. The within-group improvements were statistically significant ($p < 0.05$), and between-group comparison also favoured surged faradic current ($p < 0.05$), indicating better effectiveness, which says that surged faradic current is a better treatment option for trapezitis, the same result shown in my study where surged faradic current was added to INIT. [11]

6. Conclusion

The study concludes that Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current can be a useful technique that can be used to reduce pain and improve the neck function in the patient of chronic upper trapezius myofascial pain

"There are significant improvements in VAS, NDI, and CROM observed with the Integrated Neuromuscular Inhibitory Technique combined with Surged Faradic Current compared to Manual Trigger Point Release."

"Integrated Neuromuscular Inhibitory Technique with Surged Faradic Current can be a potentially effective treatment option in chronic upper trapezius myofascial pain".

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