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Immediate Effect of Integrated Neuromuscular Inhibition Technique Versus Integrated Neuromuscular Inhibition Technique With Surged Faradic Current on Pain & Range of Motion Among Patient With Subacute Trapezitis: A Comparative Study

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Abstract

Aim: To study the Immediate effect of Integrated Neuromuscular Inhibition Technique versus Integrated Neuromuscular Inhibition Technique with Surged Faradic Current on pain & range of motion among patient with subacute trapezitis.

Relevance of study: The study helps us to compare the need and importance of integrated neuromuscular inhibition technique and integrated neuromuscular inhibition technique with surge faradic current on pain and range of motion among patient with subacute trapezitis.

Methodology: In this Comparative study 70 patients were taken according to inclusion & exclusion criteria. Pre & post analysis were done using three outcomes measures which includes NPRS, NDI, CERVICAL CONTRALATERAL RANGE OF MOTION. The subjects were explained about the study and given information about the study how the study benefits them.

Results: On intragroup comparison using paired t test for INIT the pre intervention mean of NPRS, NDI, CLSF was 6.686±0.93, 14±4.2 ,30.2±4.19 respectively. Obtained p-value after intervention is <0.0001 which implies there is significance difference between pre- post comparison. On intragroup comparison using paired t test for INIT WITH SURGED FARADIC CURRENT the pre intervention mean of NPRS, NDI, CLSF was 6.85±0.87, 13.2±4.0,29.14±4.4 respectively. Obtained p-value after intervention is <0.0001 which implies there is significance difference between pre-post comparison.

Conclusion: In patient with trapezitis both INIT AND INIT&SF both are equally effective in decreasing pain and increasing range of motion.

Keywords: INIT, INIT & SF, PAIN, RANGE OF MOTION, SUBACUTE-TRAPEZITIS

Introduction

Neck pain as a clinical syndrome is common and can be seen in both the presence and the absence of history of trauma and or positive radiographic findings. The cervical spine is the smallest region of the spine, and so are the muscles of this region. Mechanical neck pain has a lifetime incidence of 30-50% in general world population [1]. People have a 70% likelihood of developing neck pain during their lives; thus, neck pain is an important issue affecting economic productivity in modern society. A common cause of neck pain is a mechanical dysfunction, which causes abnormal joint movement [2]. Mechanical neck pain

affects 45-54% of general population after carrying sitting posture for prolong period of time which may sometimes leads to conditions like trapezitis [3]. The exact pathology of mechanical neck pain is not clearly understood. Different authors often assume that mechanical neck pain is associated with muscular, joint and neural impairment [4]. Trapezitis is defined as inflammation of upper, middle and lower fibres of trapezius muscle. The pain is present during rest and is aggravated by activity it may be referred to other area from the site of primary inflammation [5]. Although there are many potential contributing factors to non-specific neck pain, one area that has received little scientific emphasis is the trigger point (TrP) [6]. Although, the aetiology of TrP development is currently unknown, recent studies have hypothesized that the pathogenesis results from the overloading and injury of muscle tissue, leading to involuntary shortening of localized fibers [7]. Fernandez-de-las-penas *et al*, found a relationship between the presence of muscle trigger points in upper fibres of trapezius muscle and the presence of cervical impairment [8]. A trigger point is a hyper irritable spot in a skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The spot is painful and can give rise to characteristic referred pain, referred tenderness, motor dysfunction and autonomic phenomena [9].

Chaitow feels that the combination of Muscle Energy Technique, ischemic compression and Strain Counter strain produces the most effective, targeted approach to Trigger Point release. This method is termed as the integrated neuromuscular inhibition technique (INIT) [10]. Chaitow has suggested that the benefit of the technique lies in its multifaceted approach. The INIT approach allows for delivery of the techniques in a single coordinated manner.[11]

Upper trapezius muscle is designed as postural muscle and it is highly susceptible to overuse. The pain is present even during rest and is aggravated by activity; it may be referred to other area from the site of primary degenerative. Passive range of motion may be restricted due to pain and protective spasm in antagonist groups of muscle recent studies hypothecated that the trapezitis pathogenesis result from the over loading and injury of muscle tissue leading and injury of muscle tissue leading to involuntary shortening of localized muscle fiber. The area stressed soft tissue receive less oxygen, glucose hence subsequently accumulates high level of metabolic waste product the end result of this event is the development of trigger point [12]. Strong Surged Faradic (SSF) Stimulation is a type of therapeutic electrical stimulation resulting in reduction of pain with improving joint range and mobility. Effect of Surged Faradic current: surge faradic current help in decrease in pain intensity and increase in range of motion. When a muscle contracts as a result of electrical stimulation, there is increased metabolism along with an increased demand for oxygen and foodstuffs also with a rise in the output production of metabolites. The metabolites lead to capillary and arteriolar dilatation causing a considerable increased blood flow to the muscle. This leads to removal of chemicals (metabolites) [13].

This study is a Comparative type of study, that was conducted at Physiotherapy OPD, Dr. Ulhas Patil college of Physiotherapy, Jalgaon. Study was conducted on Individual with trapezitis. The individual for study were selected by Convenient Technique of sampling. CTRI registration was done CTRI/2024/04/065607. The minimum sample size for research was 70 individual male or female having trapezitis. the duration of study was 6 months. The minimum sample size was calculated by the following formula.

The selection of participants was done on the basses of inclusion criteria which included Individual with trigger points in trapezius muscle, Individual having pain for about 3weeks up to 3 months, Having no specific pathology involved, Age: 18-30 years, Gender: Male and Female both., Pain intensity on NPRS between 2 to 6, Individual who are willing to take part in study. The participants having following characteristics were excluded Individual with any neurological problems related to cervical spine, patients with trauma and surgery around neck and shoulder in past one year, cervical myelopathy, congenital anomalies like torticollis etc, motor weakness of upper limb and fibromyalgia, Hypersensitivity of skin.

Procedure: To conduct the following study, approval will be taken from institutional ethical committee (IEC).

Subjects will be taken according to the inclusion and exclusion criteria.

Prior to starting the study, the procedure must be explained and informed written consent form will be taken from the subjects.

They will be explained about the study and given information about how the study will benefit them. Pre-measurement of all outcome measures were taken then patient was randomly divided in to either of the two groups using lottery method – Group A- INIT and Group B – INIT and SURGED FARADIC CURRENT. Data and result will be carried out.

Intervention: GROUP-A Integrated Neuromuscular Inhibition Technique. INIT comprises of sequential application of three techniques – ischemic compression, Strain counter strain (SCS) technique and muscle energy technique (MET). As the primary focus of the INIT approach is to deactivate specific TrPs, the practitioners first identified the TrPs to be treated within the upper trapezius muscle. The patient was placed in supine to reduce tension in the upper trapezius muscle. Their arm was positioned in slight shoulder abduction with the elbow bent and their hand resting on their stomach. Using a pincer grasp, the practitioner moved throughout the fibers of the upper trapezius and made note of any active TrPs. Once the TrPs were identified treatment began. The first technique applied was:

Ischemic Compression -The therapist again utilized a pincer grasp, placing the thumb and index finger over the active TrPs. Slow, increasing levels of pressure were applied until the tissue resistance barrier was identified. Pressure was maintained until a release of the tissue barrier was felt. At that time, pressure was again applied until a new barrier was felt. This process was repeated until tension/tenderness was unable to be identified or 90 s had elapsed, whichever came first. All identified TrPs were treated. IC was applied in which firm pressure is applied to the trigger point, but not sustained. Rather an on-and-off pressure application is suggested, 30 seconds of pressure, 2-3 seconds release, followed by a further 30 seconds of pressure,2-3 seconds release and then again 30 second of pressure, repeated until a perceptible change is palpated, or the individual reports a change in the reported pain sensation.

Fig 1

After ischemic compression, SCS is applied.

For SCS:
Patients in supine position and pressure was applied at painful spot then arm was moved in to abduction to achieve the position of comfort or ease in such a way that pain is relived or reduced from the palpated point. This position was maintained for about 90 seconds (3 sets). After which isometric contraction of the muscle was elicited in the form of MET.

Fig 2

Muscle energy technique group-Patient randomized to the MET group received treatment as per Lewit's post-isometric relaxation approach. The subjects were placed supine and the practitioner stabilized the shoulder on the affected side with one hand, while the ear/mastoid area of the affected side was held by the opposite hand. The head and neck were then side bent towards the contralateral side, flexed, and rotated ipsilaterally, placing the subject just short of their upper trapezius restriction barrier. The subjects then shrugged the involved/stabilized shoulder towards the ear at a submaximal, pain-free, effort (20% of their available strength). The isometric effort was held for 7–10 s while a normal breathing rhythm was maintained. During the relaxation phase, the head and neck were eased into increasing degrees of side bending, flexion and rotation to advance the stretch placed on the muscle. Each stretch was held for 30 s, and this was repeated for three to five repetitions per session.

Fig 3

Surged Faradic Current
Patient position was in supine position. The Instruction given to the patient should be comfortably seated with arm support. Patient is asked to keep the part to be treated still and relaxed and to report any increase pain or other sensation immediately. The area should be clean. The surged faradic current with the Frequency 50 Hz and pulse duration **0.1** – 1 microsecond, duration of 10 Minutes was used.

Fig 4

Fig 5

Statistical Analysis

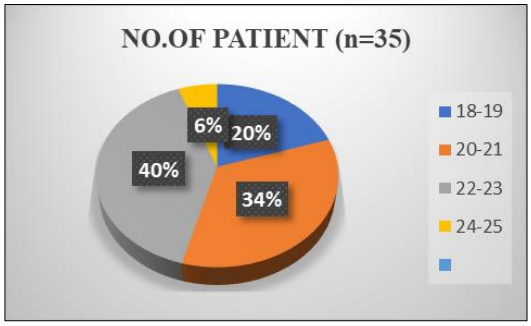
STATISTICAL METHOD USED-The entire data of the study was entered and cleaned in MS Excel before it was statistically analyzed in "GraphPad In stat version 3.10". All the results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly. The data on quantitative characteristics was presented as Mean ± Standard Deviation (SD) across study group. The statistical significance of difference of pre-treatment and post-treatment quantitative characteristics in study group (intra-group comparisons) was tested using paired' test, after confirming the underlying normality assumption of pre- and post-treatment difference of parameters. Unpaired "t" test was performed for post treatment difference of (inter-group comparison) The p-values less.

than 0.0001 are statistically significant. All the hypothesis was formulated using two tailed alternatives against null hypothesis (hypothesis of no difference). The entire data was analyzed statistically using "GraphPad In stat version 3.10" for MS Windows.

Observation and Tables

Table 1: The age wise distribution of patients

Age In Years	No. of Patients (n=35)
18-19	7
20-21	12
22-23	14
24-25	2



Graph 1: The age distribution of study patients

Table 2: The gender distribution of patients

gender	no. of patients (n=35)
Male	11
Female	24

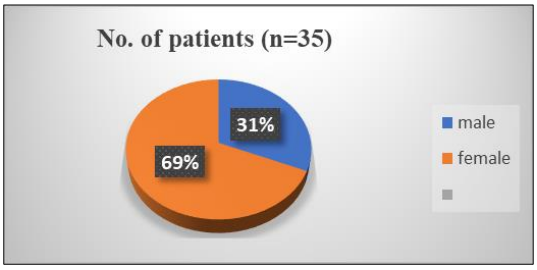


Fig 6

Table 3: Intra-group comparison of mean and SD between pre-treatment & post- treatment for INIT(NPRS)

Parameter	NPRS	Mean	SD	t-value	p-value	significance
NPRS	PRE - NPRS	6.686	0.9322	22.518	< 0.0001	extremely significant
	POST NPRS	3.8	0.8677			

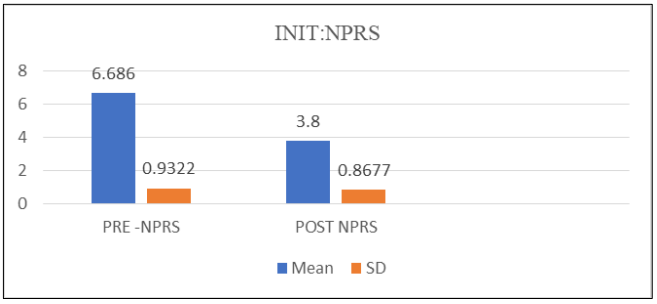


Fig 7

Table 4: Intra-group comparison of mean and Sd between pre-treatment & post- treatment INIT(NDI)

NDI	MEAN	SD	t-value	p-value	Significance
PRE- NDI	14	4.236	22.518	<0.0001	extremely significant
POST-NDI	7.571	2.649			

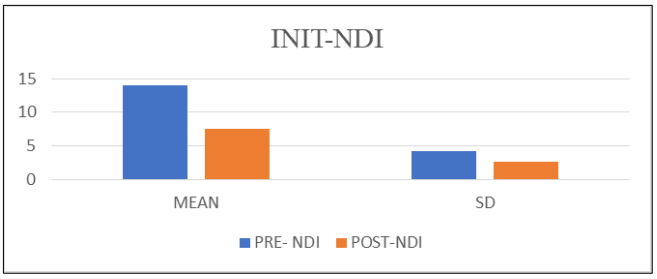


Fig 8

Table 5: Intra-group comparison of mean and SD between pre-treatment & post- treatment for INIT(CLSF)

Cervical Contralateral Slide Flexion	MEAN	SD	t-value	p-value	significance
PRE-CLSF	30.286	4.191	20.806	<0.0001	extremely significant
POST-CLSF	44	3.985			

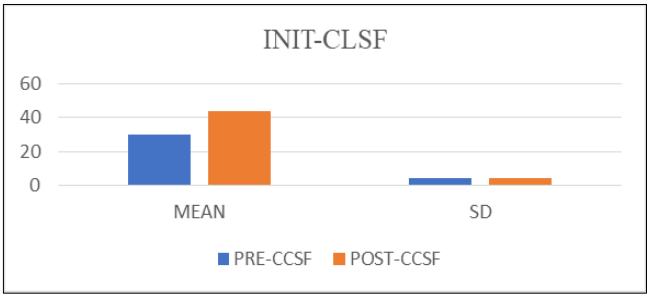


Fig 9

Group-2

Table 1: The age wise distribution of patients

Age In Years	No. of Patients (n=35)
18-19	16
20-21	17
22-23	2
24-25	0

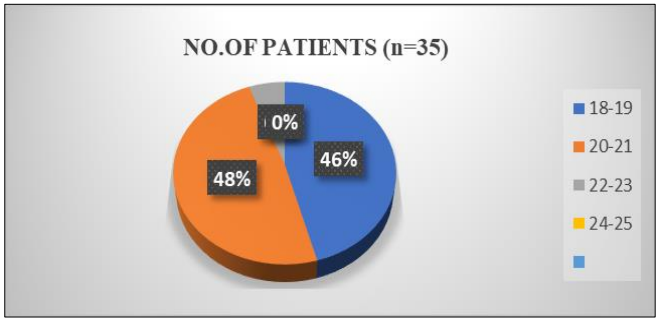


Fig 9

Table 3: Intra-group comparison of mean and SD between pre-treatment & post- treatment for INIT+SF(NPRS)

NPRS	MEAN	SD	t-value	p-value	Significance
Pre-NPRS	6.857	0.8793	21.798	<0.0001	extremely significant
Post-NPRS	3.829	0.6636			

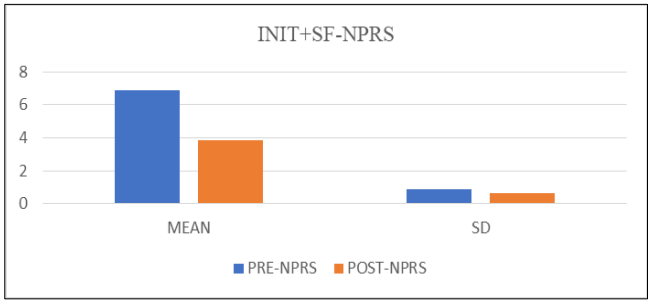


Fig 10

Table 4: Intra-group comparison of mean and SD between pre-treatment & post- treatment for INIT+SF(NDI)

NDI	MEAN	SD	t-value	p-value	Significance
PRE- NDI	13.2	4.093	16.721	<0.0001	extremely significant
POST-NDI	7	2.339			

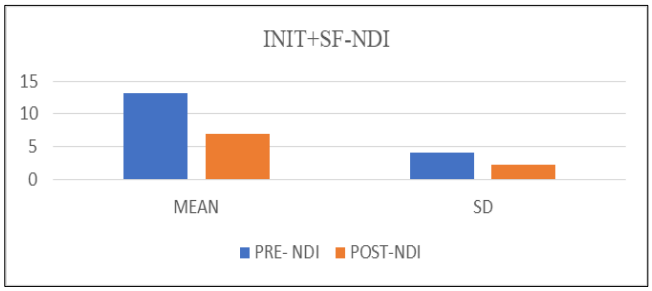


Fig 11

Table 5: Intra-group comparison of mean and SD between pre-treatment & post- treatment for INIT+SF (CLSF)

Contralateral Side Flexion	MEAN	SD	t-value	p-value	significance
PRE- CLSF	29.143	4.453	24.569	<0.0001	extremely significant
POST-CLSF	43.714	4.064			

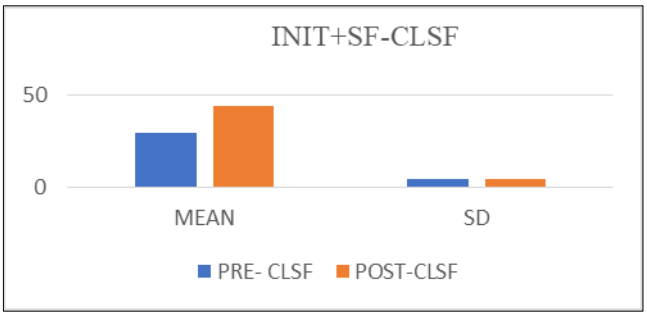


Fig 12

Group 1 & 2

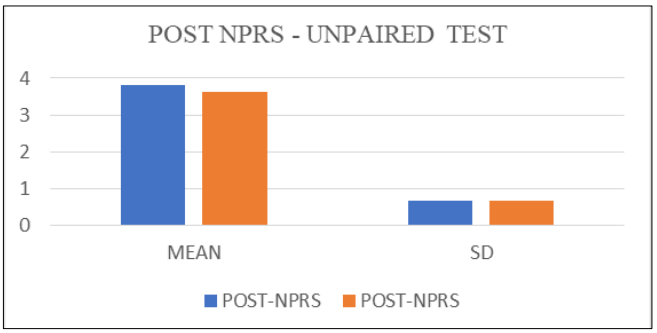


Fig 13

Table 1: Inter-group comparison of mean and SD between post-treatment & post- treatment for (NPRS)

NPRS	MEAN	SD	t-value	p-value	Significance
PRE-NPRS	3.8	0.6677	0.1547	0.8775	Not Significant
POST-NPRS	3.629	0.6636			

Table 2: Inter-group comparison of mean and SD between post-treatment & post- treatment for (NDI)

NDI	Mean	SD	t-value	p-value	significance
PRE- NDI	7.571	2.649	0.9567	0.3421	not significant
POST-NDI	7	2.339			

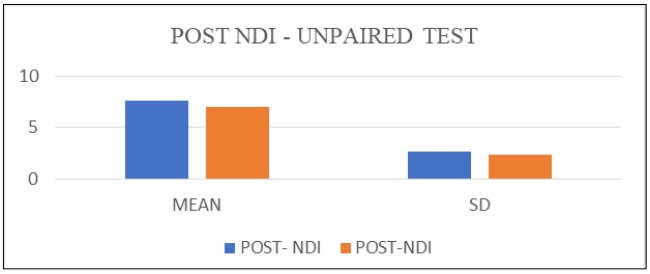
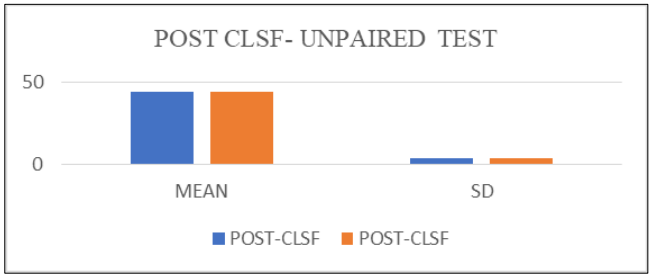


Fig 14

Table 3: Inter-group comparison of mean and SD between post-treatment & post- treatment for (CLSF)

Cervical Contralateral Slide Flexion	Mean	SD	t-value	p-value	significance
POST-CLSF	44	3.985	0.2962	0.768	NOT SIGNIFICANT
POST-CLSF	43.714	4.084			



Results

Group-1

Total 35 subjects were included in the study from age 18-30 of which 19 subjects were between 18-21 years, 2 subjects were between 22-30 years from which 11 were male and 24 were female according to the inclusion and exclusion criteria. For INIT(NPRS) pre-intervention mean for NPRS was 6.686 ± 0.93 and post-intervention mean for NPRS was 3.800 ± 0.86 (p-value<0.001). NDI pre-intervention mean for NDI was 14 ± 4.2 and post-intervention mean for NDI was 7.571 ± 2.6 (p-value<0.001). CLSF pre-intervention mean for CLSF was 30.286±4.1 and post-intervention mean for CLSF was 44±3.9 (p-value<0.001). which implies there is significant decrease in pain and significant increase in lateral cervical flexion using integrated neuromuscular inhibition technique on pain and lateral cervical flexion in patient with subacute trapezitis

Group-2

Total 35 subjects were included in the study from age 18-30 of which 33 subjects were between 18-21 years, 2 subjects were between 22-30 years from which 13 were male and 22 were female according to the inclusion and exclusion criteria. For INIT& SURGED FARADIC CURRENT(NPRS) pre-intervention mean for NPRS was 6.857 ± 0.87 and post-intervention mean for NPRS was 3.829 ± 0.66 (p-value<0.001). NDI pre-intervention mean for NDI was 13.2 ± 4.09 and post-intervention mean for NDI was 7 ± 2.3 (p-value<0.001). CLSF pre-intervention mean for CLSF was 29.143±4.45 and post-intervention mean for CLSF was 43.7±3.5 (p-value<0.001). which implies there is significant decrease in pain and significant increase in lateral cervical flexion using integrated neuromuscular inhibition technique on pain and lateral cervical flexion in patient with subacute trapezitis.

Discussion

Repetitive motions and the use of smart phones and tablets in abnormal head postures can stress the head, neck, and shoulder areas.

Additionally, abnormal head posture can cause mechanical dysfunction of the cervical joint, which can lead to pain, fibrosis of soft tissue, adaptive shortening, loss of flexibility, and mechanical deformation reflecting the condition of hypomobility, where there is no movement inside the normal joint capsule.

The present study was carried to compare the effectiveness of INIT along with INIT WITH SURGED FARADIC CURRENT to reduce pain and increase lateral cervical flexion range in patient with subacute trapezitis.

Initially 35 subjects met the inclusion criteria were recruited into the study on which INIT had been performed and then another group of 35 subjects met the inclusion criteria were recruited into the study on which INIT with surged faradic current had been performed.

The results of this study shows that subjects in experimental group who received INIT along with INIT with surged faradic current there was a significant reduction in pain by a mean change of NPRS, NDI, CERVICAL CONTRALATERAL SIDE FLEXION RANGE.

INIT and INIT along with surged faradic Current also reduced the participant's neck disability. Our study Agree with the previously published trials indicating the effect of INIT. Study conducted by Mrs. B. Jyothirmai (2015) the effect of INIT on upper trapezius trigger points in subjects with non –specific neck pain on 30 subjects in which Group A comprised of 15 subjects and was treated with integrated neuromuscular technique who received INIT had reduced their pain levels by VAS.

Chaitow, 2001; Farina *et al*, 2004 integrated neuromuscular inhibitory technique (INIT). The effectiveness of INIT was reported in two case series, which showed rapid results. Travell described that the ischemic compression decreases the sensitivity of pain nodules in the muscles and Simons proposed that the that the local pressure may equalize the length of the sarcomere in the involved muscle and decrease the pain.

The IC therapy with quantified pressure and duration found that it provided immediate pain relief and reduced the MTrP sensitivity of the cervical myofascial pain. Our results are also in agreement with previously published trial, which proved to have significantly greater improvement in VAS score in favor of the INIT group at the 4-week follow-up points. They have compared the effects of two manual treatment regimens (MET and INIT) on individuals with upper trapezius trigger points. Pain relief through IC treatment was achieved from reactive hyperemia in the MTrP region, counterirritant effects, and a spinal reflex mechanism for the relief of muscle spasm. The pain reduction may be due to the stimulation of mechanoreceptors which has influence on pain gate during the application of trigger point pressure release and increased circulation, after releasing the pressure which ultimately resulted in pain reduction.

In addition, SCS has been proposed as a mechanism of facilitating unopposed arterial filling which allows for the reduction of tone in muscle and decrease pain.

Positional release technique helps in reducing tender point in the affected muscle by the mechanism of automatic resetting of the muscle spindles. The shortened position of the muscle is a nonthreatening position for a muscle in spasm and reduced pain.

The MET technique showed significant results in treatment of trapezius muscle spasm. In the present study addition of surged faradic current approach proved to be effective in improving all the three outcomes, these results again agree with the previous research in this area as reports have indicated the benefit of such approach in reducing pain and significantly improving the functional status.

In MET, the sequence of muscle and joint mechanoreceptor

activation evoked firing of local somatic efferent. This in turn led to sympathy excitation and activation of the periaqueductal gray matter, which resulted in the activation of descending modulation of pain. In addition, stimulation of mechanoreceptors and
simultaneous gating of the nociceptive impulses occurs in the dorsal horn of the spinal cord. Therefore, this study is in agreement with earlier studies which indicate that strength training leads to a decrease in pain. A decrease in pain leads to an improvement in function as can be seen by the improvement in the score of NDI for both the groups.
Electrical currents help in reducing the pain by assisting in the process of healing or by altering the transmission and perception of pain.
Electrical currents lessen the degree of muscle spasm by reducing the sensitivity of the muscle spindle system which eliminates the mechanical and chemical events stimulating transmission of pain. With the relief in muscle spasm, the ROM restricted increases There was statistically significant improvement with Surged Faradic Stimulation in ROM on subjects having myofascial trigger points of trapezius in a study conducted by Akanksha A. Nala wade and Poonam H. Patil. The result of this study for SSF Stimulation intervention is in line with the result of the research conducted by Kshama S. Shetty and A. Joseph Oliver Raj stating that Surged Faradic current has got beneficial effect in improving pain intensity and ROM on myofascial trigger point of upper trapezius. Pain reduction may be due to activation of mechanoreceptors by pain gate mechanism during trigger point pressure release which results in increased circulation ultimately resulted in pain reduction. The conclusion of the study was that patients with trapezitis both, Integrated neuromuscular inhibition technique approach (INIT) and Integrated neuromuscular inhibition technique with surged faradic current to the treatment of TrPs (trigger points) has proven to be more beneficial in relieving pain, reducing stiffness, improving functional ability, and increasing cervical contralateral flexion.
Limitation
It is not assured if the differences observed at Post treatment could be maintained over longer periods of time.
No follow up was done.

Suggestions and Future Scope of Study
A randomized control trial can be conducted. Pain assessment will be taken by objective measure using pain algometer.

Clinical Implications
In recent times in some occupations work in static sedentary postures for long hours in order to perform the tasks required. This can cause shortening in the neck muscle, which subsequently leads most people to adopt trapezitis. INIT along with surged faradic current can be use clinically to treat patient with sub-acute trapezitis among young individuals.

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