

### Immediate Effects Of Strong Surged Faradic Current And Ultrasound On Trigger Points Of Upper Trapezius: A Pilot Study

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#### Abstract :

**Background :** Myofascial trigger points (MTrP) are found in most of musculoskeletal conditions and common in upper trapezius muscle due to sustained activity & incorrect posture. Clinically Strong surged faradic current (SSF) is found to be effective in its management. Evidence on effects of Ultrasound (US) is available. But due to lack of evidence for SSF; its immediate effect were compared with US. **Method :** It was a single blinded experimental study. 30 patients assigned into two groups (15 US, 15 SSF) with upper trapezius trigger point; age group 20-40 years participated in this study. Traumatic and degenerative conditions were excluded. Numerical Rating Scale for pain, pressure algometer for tenderness and Goniometer for lateral flexion of cervical range were used as outcome parameters. Evaluation was done before, after and on follow up of 24 hours of treatment. **Results :** Statistically significant difference ( $p < 0.05$ ) for pain was revealed using Wilcoxon and Mann Whitney U test for intra and inter group respectively. Paired t test and unpaired t test showed significant results for tenderness and ROM for intra and inter group respectively except for Ultrasound which showed insignificant results for tenderness ( $p = 0.05$ ) and ROM ( $p = 0.22$ ) after 24 hours of treatment. **Conclusion :** SSF was found to have positive

effect after 24 hours on resolution of trigger points thus reducing the tenderness and increasing ROM. Its long term effect should be studied further. **Keywords :** Myofascial trigger point, Pressure Algometer, Strong Surged Faradic current, Therapeutic Ultrasound

**Introduction :** Myofascial trigger points (MTrP), also known as trigger points, which are described as hyper-irritable localized areas in the fascia surrounding skeletal muscle.<sup>[1]</sup> They are associated with palpable nodules in taut bands of muscle fibers and twitch response can be elicited on stimulation of the trigger point. They may develop after overuse and sustained activity in incorrect posture, in prolonged spasm of muscles or trauma. Pain is aggravated with activity or stress. Palpation of the trigger point reproduces the patient's complain of pain, and the pain radiates in a distribution typical of the specific muscle harboring the trigger point.<sup>[1,2]</sup> Being a postural muscle Trapezius is more prone to develop trigger points.<sup>[3]</sup> Different therapies available in treatment of trigger points include manual therapy, electrical therapy, thermotherapy, spray and stretch, local anesthetic and needle injection, acupuncture, stress reduction, body mechanics, ergonomic training, nutritional counseling and a wide range of pharmacological management.<sup>[4,5]</sup>

Faradic current is a short duration interrupted current which can be surged for treatment purpose to produce a near tetanic like contraction and relaxation of muscle. Surging means the gradual increase and decrease of the peak intensity. There is increased metabolism, with a consequent increase in demand for oxygen, an increased output of waste products, including metabolites and increased venous and lymphatic return with continuous muscle contraction. The metabolites cause dilatation of capillaries and arterioles and there is a considerable increase in the blood supply to the muscle.<sup>[6]</sup> There is evidence showing efficacy of faradic current in management of trigger points.<sup>[7]</sup>

Thermal and mechanical effects of ultrasound help in increasing local metabolism, circulation and breaking down the adhesions.<sup>[6]</sup> However, results in the studies related to its efficacy in the musculoskeletal system problems are conflicting.<sup>[8-14]</sup>

There seems to be a lack in literature to establish the

effectiveness of strong surged faradic current in management of trigger points in upper trapezius. Thus, this study was done to compare its immediate effect in comparison to ultrasound which has relatively established studies.

**Material & Methods:** : The study was reviewed and approved by the ethical reviewing board.

Patients of 20-40 years of age ( $29.73 \pm 6.86$ ) group having pain on either sides of upper trapezius muscle were included in the study.

The criteria for excluding subjects were: patients contraindicated for these modalities, patients with cervical radiculopathy, cervical fractures, whiplash injury and patient receiving treatment by other methods.

A total of 30 subjects (19 females; 11 males) participated in the study and were consented.

15 subjects were allotted into each group (group A-Ultrasound and group B-Strong Surged Faradic current) randomly by chit method.

**Study design- Experimental single blinded study**  
**Outcome measures-**

1) **Numerical Rating Scale (NRS) for pain** : Patients' were asked to rate their perceived pain where "0" is "No Pain" and "10" is "most severe pain."<sup>[15]</sup>

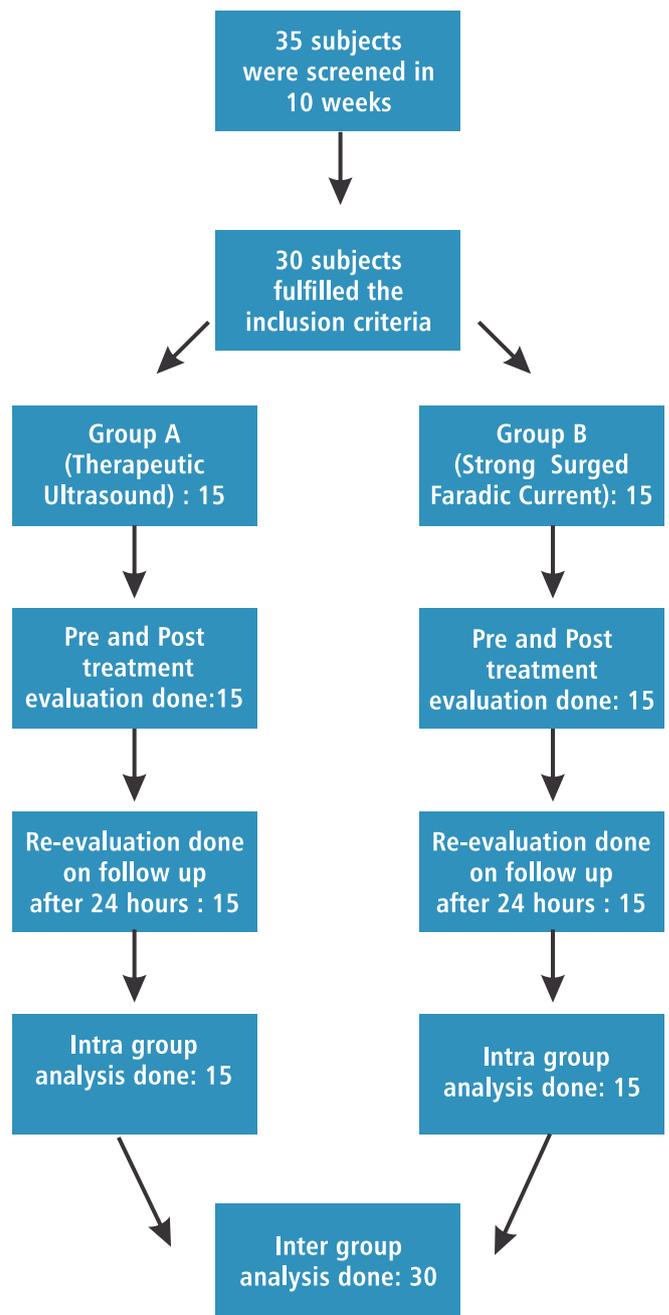
2) **Digital Algometer (Mfd. by-Electronic Engineering Corporation, Tamilnadu) for tenderness** : This form of measurement has been proven to be useful and reliable for the assessment of treatment results.<sup>[16]</sup> The pressure algometer probe was placed perpendicular to the trigger point of upper trapezius. Pressure was increased slowly and continuously asking the patient to respond when he/she perceived first pain sensation and the reading was recorded. This procedure was repeated two times and the lower reading was taken into consideration.

3) **Goniometry for range of motion** : Patient was positioned in a high sitting with back rest and arm supported on the pillows or thigh. The fulcrum of the Goniometer was placed on C7 vertebrae with stable arm in line with the spine and movable arm aligned with the midline of subject's head and lateral flexion of neck was measured. The movable arm of Goniometer was aligned

with the midline of head and the reading was recorded.<sup>[17]</sup>

**Study protocol :**

**Fig 1 : Study protocol**



**Procedure :** Patient with neck pain in trapezius area were checked for inclusion and exclusion criteria and written informed consent was taken and were allocated to both the groups randomly by chit method. Group A was treated using therapeutic ultrasound (US) over the most tender spot in a circular pattern and Group B was treated with

Strong Surged Faradic current (SSF), with electrodes placed around the trigger point. Evaluation of outcome measure was done and treatment was given. Re-evaluation was done post treatment and on follow up of 24 hours. All patients were evaluated by the researcher who was blinded about the treatment given.

**Treatment parameter :**

1) Strong Surged Faradic current :Patient position - high sitting with back support, Surge interval- 4sec ,Surge duration- 2 sec , Duration -10 min, Intensity - gradually increased till mild contraction is visible , Frequency - 50 Hz.<sup>[18]</sup>

2) Therapeutic Ultrasound :Patient position- high sitting with back support, Mode- continuous , Intensity - 0.8Watts/cm2 (adjusted according to patients feeling of perceptible warmth), Duration - 5 min, Frequency -1 MHz.<sup>(8)</sup>

No adverse effects were noted by any of the subjects as a result of either treatment.

**Statistical Analysis :** Analysis was conducted using SPSS software (version 20). Pain scores were compared using Wilcoxon and Mann Whitney U test for intra and inter group respectively. Tenderness and range of motion was compared using paired and unpaired t test for intra and inter group respectively. A p-value less than or equal to 0.05 was considered as statistically significant for all the comparisons.

**Results :**

Table 1: Between groups subject Demographic Data

	SSF group	US group
Sample size[ N=30]	n= 15 (F-9,M-6)	n= 15 (F-10,M-5)
Age (mean ± SD)	29.17 ±7.11	29.17 ±6.8

F - Female, M- Male

**Table 2: Intra group analysis of pre, post & follow up outcome measures**

	pre(mean± SD)	post(mean± SD)	follow up(mean± SD)	p (pre post)	p (post followup)	p (pre follow up)
<b>1)NRS</b>						
US	5.73 ± 1.16	4.07 ± 1.38	4.6 ± 1.35	0.000*	0.000*	0.000*
SSF	6.47 ± 1.24	4.2 ± 1.37	3.60 ± 1.54	0.000*	0.028*	0.000*
<b>2)Tenderness</b>						
US	2.22 ± 0.67	2.38 ± 0.61	2.02 ± 0.63	0.01*	0.000*	0.05*
SSF	1.97 ± 0.87	2.38 ± 0.78	2.52 ± 0.81	0.000*	0.018*	0.000*
<b>3)ROM (unaffected side)</b>						
	37.07 ±					
US	5.44	38 ± 5.23	37.27 ± 5.53	0.002*	0.001*	0.228
SSF	36.53 ± 5.53	39.20 ± 5.48	38.33 ± 5.56	0.000*	0.003*	0.000*

\*=significant

**Table 3 : Inter group analysis between outcome measures**

	pre-post	post-follow up	pre-follow up
1) NRS	0.037*	0.000*	0.000*
2)Tenderness	0.025*	0.000*	0.000*
3)ROM (unaffected side)	0.000*	0.35	0.000*

\*=significant

**Discussion :** This was a pilot study done in order to evaluate effects of Strong Surged Faradic (SSF) current on myofascial trigger points in upper trapezius. SSF current is used frequently in clinical practice but due to limited reviews on faradic current immediate effects were evaluated post treatment and on follow up of 24 hours. It was compared with Therapeutic Ultrasound (US) as there are relatively established studies for the same.<sup>[8-15]</sup>

A positive effect on reduction of pain and tenderness was seen in both the groups (SSF and US) immediately after the treatment and on follow up after 24 hours.

Reduction of pain in SSF group might be due to stimulation of the afferent nerve fibers which decreases the inhibitory effect caused by pain on the large anterior horn cells and influencing the alpha motor neurons. There is sufficient muscular contraction and relaxation leading to pumping effect on venous and lymphatic vessels which causes removal of waste products thus helping in reduction of

pain.<sup>[6]</sup> A quantitative pilot placebo controlled clinical trial by Bedell-Sivright<sup>[7]</sup> concluded the efficacy of Therapeutic Faradic Stimulation in patients with Myofascial Pain Syndrome of the Trapezius. Whereas in US group positive results were seen because of its thermal effect; as it increases local metabolism, circulation and stimulation of mechanoreceptors in the tissue which then have an effect on cells in the spinal cord of reducing the appreciation of pain at a peripheral level (the 'pain-gate' theory). Priya K<sup>[8]</sup> in her randomized controlled trial compared ultrasound with laser and ischemic compression, put forward similar results which was a 5 days trial and with same treatment parameter. Draper Do et al<sup>[14]</sup> in his study, has put forward the beneficial effect of thermal ultrasound and has stated that the thermal ultrasound technique over trigger points can decrease stiffness of a trigger point.

Group treated with SSF showed reduction in tenderness; immediately after the treatment and on re-evaluation after 24 hours as a result of sufficient muscular contraction and relaxation causes pumping effect on venous and lymphatic vessels which leads to removal of waste products thus helping in reduction of pain and ultimately reducing the spasm. Thus, breaking the vicious cycle of pain- spasm-pain reduces the tenderness. It is supported by a quantitative pilot placebo controlled clinical trial by Bedell-Sivright<sup>[7]</sup> which was a 1 week intervention study.

Group treated with US showed a significant improvement in reducing the tenderness immediately after the treatment and on follow up after 24 hours as a result of micro massage effect of this therapy. This effect occurs at a cellular level where cells are alternately compressed and then pulled further apart and is claimed to have an effect on inter cellular fluids thus reducing the spasm and tenderness.<sup>[6]</sup> Draper Do et al<sup>[14]</sup> in his study has put forward the beneficial effect of thermal ultrasound and has stated that the thermal ultrasound technique over latent trigger points is comfortable and can decrease stiffness of a trigger point.<sup>[13]</sup>

SSF has shown statistically significant result in increasing the lateral flexion of the neck; immediately after treatment and on follow up of 24 hours as there is resolution of trigger points and reduction in pain and muscle spasm. Contraction and relaxation of muscles produce pumping

action which increases blood supply to the muscles as a result of increased demand and supply of oxygen and nutrition. There is increased metabolism, with a consequent increase in output of waste products, including metabolites causing dilatation of capillaries and arterioles which further increases the blood supply (Forster and Palastanga).<sup>[6]</sup> Thus it is found that there is a sustained effect of SSF may be due to increased blood supply and nutrition to the muscle. A quantitative pilot placebo controlled clinical trial by Bedell-Sivright concluded the same result which was intervention of 1 week compared with Therapeutic Faradic Stimulation.<sup>[7]</sup>

There was increase in neck range immediately after the treatment in US group due to resolution of trigger point, breaking of adhesions and reduction in pain. Ustun N et al and Arslan Fin their study got the statistically significant results in increase in range which was compared with EMLA cream phonophoresis.<sup>[12]</sup> Priya K<sup>[8]</sup> in her trial has shown evidence for the positive effect of therapeutic ultrasound in improving lateral flexion of neck.<sup>[8]</sup> However, this study shows that on follow up after 24 hours of treatment, the range was reduced as compared to the readings obtained immediately after the treatment.<sup>[7]</sup> The results returned to pre-treatment readings as there was no sustained effect because inflammation and spasm did not get completely resolved within 24 hours.

Mean difference in the change of scores between the assessments showed SSF to have a tendency of sustained effect over the trigger points and a better improvement than the ultrasound therapy. As SSF treatment involves the whole muscle to contract and relax with increase in blood supply and nutrition to the muscle whereas ultrasound is localized only to the trigger point release and breaking the adhesions thus failing to give the sustained effect of the treatment. SSF is also cost-wise cheaper and therapist friendly equipment.

**Conclusion :** Pain and tenderness reduction was found in both the groups; SSF and US immediately after treatment and on follow up evaluation in the studied population. US showed positive results immediately after the treatment for increasing ROM. However, the readings came back to the pre-treatment, on evaluation after 24 hours. There was significant improvement and beneficial effect with even

SSF after 24 hours of treatment as found on re-evaluation for increasing ROM. To use SSF, longer intervention is needed to be studied till pain is completely resolved.

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