



Added effect of strain counter-strain technique on pain & Cervical ROM in students with mechanical neck pain with upper trapezius trigger points. A RCT

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ABSTRACT

Objectives

To assess the added effect of Strain Counter-strain (SCS) technique along with conventional treatment on pain & cervical ROM in students with mechanical neck pain with upper trapezius trigger points.

Methods

In this experimental study, forty students with mechanical neck-pain & upper trapezius trigger points were randomly allocated into two groups, control or experimental group. The control group received conventional therapy consist of moist heat, supervised exercises and trapezius stretching and experimental group received Strain Counter-strain technique along with conventional therapy. Treatment was given once a day for 5 days. A numerical rating scale (NRS) was used to measure the intensity of pain, functional disability was assessed using NDI i.e. neck disability index, and cervical ROM was measured with universal goniometer. Data analysis was done on 5th day.

Results

On pre post analysis, NRS, NDI scores and cervical ROM showed a statistically significant improvement in both control and experimental groups ($p < 0.0001$). However, between group analysis both NRS and NDI scores showed statistically significant improvement in the experimental group ($p < 0.0001$). The range of motion for cervical flexion ($p = 0.3184$) and extension ($p = 0.3126$) was equally improved in both the groups. But, lateral flexion and rotation on both sides were statistically significantly improved in experimental group than in control group ($p < 0.0001$).

Conclusion

Strain counter strain technique along with conventional treatment is effective in relieving pain & improving cervical lateral flexion and rotation ROM in students with mechanical neck pain with upper trapezius trigger points.

Keywords: Neck pain, Strain counter strain, Upper trapezius, Trigger points.

INTRODUCTION

Neck pain is a common musculoskeletal disorder seen in the general population. Point prevalence ranges from 6% to 38% of the elderly population and lifetime prevalence is from 14.2% to 71% [1]. Prevalence in female is more than male (83%). Worldwide 6 month prevalence of neck pain for 18 year old females is 45% [2]. The International Association for the Study of Pain defines neck pain as: "Pain perceived from the region bounded superiorly by superior nuchal line, inferiorly by an unoriginally transverse line through the tip of first thoracic spinous process, and laterally by lateral border of neck [3].

Myofascial pain syndrome is a muscle disorder caused because of presence of myofascial **trigger points** [4]. Researchers clinically define a myofascial trigger point (MTrP) as "a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band." These hypersensitive spots are painful when pressure is applied and can produce referred pain or tenderness, motor dysfunction, and autonomic reaction [5]. Trigger points can be active or latent, depending on their characteristics. The pain caused by trigger points is often described as spreading or radiating. The trigger point can be differentiated from tender point, as tender point is associated with pain and tenderness at the palpation site only.

The **upper trapezius** is the muscle most often affected by myofascial trigger points (MTrPs). Fischer et al. measured the pressure pain threshold (PPT) with a pressure algometer of 8 different muscles and found that the upper trapezius was most sensitive muscle to the pressure. [6]

Many researchers agrees that acute trauma or repetitive micro trauma are the reason for development of a trigger point. Lack of exercise, joint problems, prolonged bad posture, vitamin deficiency and sleep disturbances all these may predispose to the formation of trigger points. [7]

Many treatments are available in physical therapy to treat these MTrPs such as Ischaemic compression technique, stretching technique, Strain Counter-strain technique, Trigger point pressure release therapy, Ultrasound, deep heat therapy, Laser Therapy, Dry needling, Transverse Friction massage (Cyriax), Post isometric relaxation (MET), Electrical muscle stimulator etc.[7]

Strain-Counter strain (S-CS)

Invented by Laweren Jones is a gentle, indirect manipulation technique for the treatment of many somatic dysfunctions where positioning of the body is used to manifest a therapeutic effect. [7]

There are different studies

Which noted the use of strain counter-strain technique combined with other interventions for treating a variety of disorders like chondromalacia patellae, low back pain, pancreatitis, and cervicothoracic pain. Many researchers did study on patients with localized myofascial pain syndrome and found that the strain counter strain technique was effective in pain reduction and improving functional ability. [8]

Trapezius trigger points when in active state causes spreading pain and radiation and hence unsettling. Therefore, it is important to find out the new, easy and quick ways to treat these trigger points. [7]

There are studies which prove that combination of SCS with other manipulation has immediate effect on pain reduction on tender points. But no study has been done to prove whether this technique alone has pain reduction effect on trigger points and improvement in cervical ROM. [7]

Therefore it is important to find out the effect of strain counter-strain technique on trigger points so that it can be used in clinical practice.

METHODOLOGY

After receiving ethical clearance from the institutional committee of the Physiotherapy College, students with neck pain having upper trapezius trigger points were evaluated according to the following criteria: (1) Females between ages of 18-30 yrs. (2) Participants with mechanical neck pain with upper trapezius trigger points (3) reduced cervical ROM (4) upper trapezius spasm. (5) Subjects with unilateral & bilateral involvement. (6) Participants scoring above 5 on numerical rating scale (NRS). (5) Participants scoring 5-24 on neck disability index (NDI). Participants with whiplash injury or fracture of cervical spine; PIVD, Cervical instability, cervical spine or shoulder surgery in past 1 year; cervical radiculopathy or myelopathy, vertigo, dizziness at rest were excluded from the study.

Forty participants met these criteria. A informed consent form was taken from all the participants in written format and the procedure was explained to every participant by the therapist.

Formation of groups

Individuals satisfying the inclusion criteria were randomly divided into Group A (control) or Group B (experimental) by chit method. The division was done by the therapist prior to the assessment. Group A underwent conventional therapy consist of moist heat, supervised exercises and upper trapezius stretching. Group B underwent conventional therapy along with Strain Counter-strain (SCS) technique [9].

Outcome measures

- Numerical Rating Scale for assessment of pain[10],
- Neck disability index (NDI) for functional assessment [11].
- Universal Goniometer used for assessment of range of motion[12],

Myofascial trigger point Diagnosis: [13]

The therapist used her thumb and pointer finger to palpate the muscle. Presence of a palpable taut band; hypersensitive tender spot; local twitch response induced by the palpation of the taut bands; reproduction of referred pain cause by the myofascial trigger points, and a positive jump sign denotes the presence of MTrPs.

INTERVENTION

Group A (control group)

Received conventional therapy [14] which includes

Moist heat

In the form of hot pack for 10mins. Position: In sitting on chair with head supported on table in front.

Supervised exercises

Neck isometrics for flexion, extension, lateral flexion, rotations, shoulder shrugs and scapular retraction with shoulder 90° abducted. 5 sec hold was given for 10 times for each exercise.

Trapezius stretching

Position of the subject was sitting on chair and subject's head was passively taken into cervical flexion, contralateral flexion and ipsilateral rotation. The position was maintained for 30 sec. The technique was given twice per session. [15]

Group B (experimental group)

Received strain counter-strain technique along with conventional therapy. For strain counter strain technique, Subject's Position: seated on chair with neck in a neutral position. Then therapist palpated the upper trapezius muscle with the thumb for locating trigger point. After locating trigger point, the therapist applied gradually increasing pressure until the subject feels the pressure and pain at the same time. At that point, the subject was passively taken into a position which reduces the tension under the therapist's thumb and reduces the pain by around 70%. For upper trapezius, the position which reduces pain was upper extremity of treatment side in 90° of abduction, cervical flexion, ipsi-lateral side-flexion, and 5-8° of contra-lateral cervical rotation. This position was maintained for 90 sec. After 90 sec, the subject was slowly taken into the neutral position. Two trigger points were treated on each side per session for 5 consecutive days. On 5th day, after treatment re-evaluation was done with NRS, NDI and cervical ranges were taken with universal goniometer.

RESULTS

Table.1. Demographic data

	Number	Mean
Females	Group A=20, Group B= 20	20
Age	18-25	21

Table.2: Analysis of numerical rating scale

GROUPS	Mean		p value	w value	U value
	Pre	Post			
NRS on activity	Control	6.8± 0.915	3.6±0.7539	<0.0001**	210
	Experimental	7.25± 0.9105	0.7±0.7327	<0.0001**	210
NRS at rest	Control	2.5±0.7609	1±0.7255	<0.0001**	190
	Experimental	3.35±1.309	0.05±0.2236	<0.0001**	190

**= Extremely Significant.

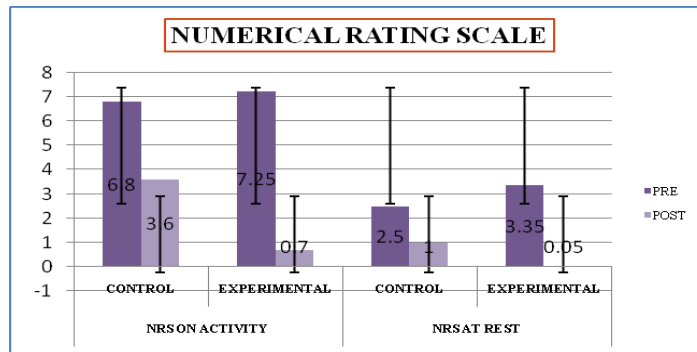


Table 3: Analysis of neck disability index

GROUPS	Mean		p value	w value	U value
	Pre	Post			
Control	18.834 ± 6.438	9.457 ± 4.374	<0.0001**	210	46 (p value <0.0001)
Experimental	20.889 ± 7.425	4.097 ± 1.877	<0.0001**	210	

** = Extremely significant

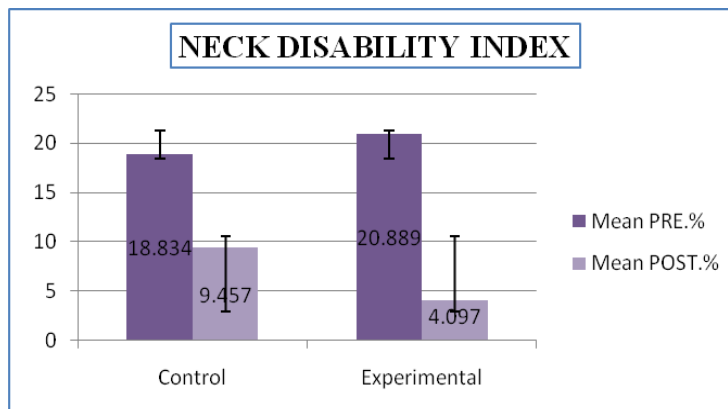


Table 4. Analysis of cervical range of motion

	GROUPS	Mean		p value	t value	Unpaired t value
		Pre	Post			
FLEXION	Control	36.4± 4.285	39.9± 4.723	<0.0001**	7	1.011
	Experimental	32.95 ± 6.004	37.15 ± 4.637	<0.0001**	8.768	(p value= 0.3184#)
EXTENSION	Control	47.25 ± 5.035	49.9 ± 5.17	<0.0001**	10.025	1.023
	Experimental	44.65 ± 8.197	47.85 ± 8.647	<0.0001**	6.839	(p value=0.3126#)
LATERAL FLEXION (Rt)	Control	21.1 ± 4.064	24.5 ± 3.804	<0.0001**	12.803	14.565
	Experimental	21.15 ± 3.843	29.05 ± 2.929	<0.0001**	14.565	(p value<0.0001**)
LATERAL FLEXION (Lt)	Control	19.7 ± 3.922	23.95 ± 3.591	<0.0001**	19.664	6.116
	Experimental	21.55 ± 3.395	29.6 ± 2.371	<0.0001**	13.819	(p value<0.0001**)
ROTATION (Rt)	Control	59.2 ± 13.548	64.5 ± 12.775	<0.0001**	13.543	9.359
	Experimental	54.1 ± 7.88	68.60 ± 7.185	<0.0001**	16.08	(p value<0.0001**)
ROTATION (Lt)	Control	61.15 ± 10.525	66.20 ± 10.636	<0.0001**	16.195	9.211
	Experimental	58.7 ± 10.337	72.4 ± 7.789	<0.0001**	15.465	(p value<0.0001**)

** = Extremely Significant, # = Not Significant.

Within group analysis of NDI and NRS done by Mann Whitney test showed improvement post treatment in both the groups but experimental group showed statistically significant improvement in pain as well as function (p <0.0001)

Between group analysis of NRS and NDI done by Wilcoxon Sign Rank test, which showed improvement in both groups post treatment but experimental group showed more statistically significant improvement. (NRS: p value <0.0001, U value on activity is 0.5 and at rest is 47; NDI: p value <0.0001, U value=46)

Within group analysis of cervical range of motion done by paired t test showed improvement in all movement. But, cervical lateral flexion and rotation showed statistically significant improvement post treatment in experimental group.

Between group analysis of cervical flexion and extension done by unpaired t test showed

insignificant improvement in both the groups. (P for flexion = 0.3184 and t value for flexion = 1.011; p value for extension = 0.3126, t value for extension = 1.023). On analysis of cervical lateral flexion and rotation found that there was statistically significant improvement in experimental group than control group. (P value < 0.0001 and t value for lateral flexion Rt. = 7.451, Lt. = 6.116; t value for rotation Rt. = 9.359, Lt. = 9.211)

DISCUSSION

The study was performed to assess the added effect of Strain Counter-strain (SCS) technique along with conventional treatment on pain & cervical ROM in students with mechanical neck pain with upper trapezius trigger points.

The study was performed on 40 subjects with chronic mechanical neck pain having myofascial

trigger point in trapezius muscle. Then Subjects were randomly divided into experimental and control group (n=20) respectively in which the experimental group received S-CS technique along with Moist Heat, postural correction exercises, stretching, and control group received Moist Heat, postural correction exercises, stretching only.^[12] Each patient received continuous 5 days treatment. The outcome measure was Numerical Rating Scale, Neck Disability Index and Cervical Goniometry.

In this study, as shown in graph 1, the changes observed in **NRS** are statistically significant in both the groups, control ($p < 0.0001$) as well as experimental ($p < 0.0001$) but experimental group showed more statistically significant improvement ($p < 0.0001$; U at rest= 47; U on activity=0.5). This comparison between two groups of the study reveal that the amount of trigger point pain reduction is statically significant when conventional treatment was combined with strain counter strain technique than conventional treatment alone. Improvement in pain in control group is might be because of muscle relaxation and sedation of sensory nerve endings offered by moist heat [16] and passive slow sustained stretch, as this stretch causes mechanical disruption of the cross-bridges as the filaments slide apart leading to reduction in muscle spasm in turn reducing pain. [15]

The reduction in pain in experimental group can be explained by the neurophysiology [17] of Strain Counter Strain technique. Prolonged bad posture causes stretching of the muscles which increases motor firing in afferent nerve fibers. This aberrant afferent flow from muscle spindle causes reflex muscle spasm, which resists the joint to come back to neutral position. This movement causes pain in muscle spindle. Diagnosis is made by the presence of trigger points. Using trigger point as monitor, the operator is guided into a position of comfort where muscle is in most shortened position and this reduces aberrant afferent flow. Holding the position for 90 sec. allows spindle to slow down afferent firing frequency [17]. Returning the muscle in neutral position in slow deliberate way will avoid re-excitation. This will help to normalize the tone and length of affected muscle. [8]

On pre-post analysis of cervical flexion and extension ROM showed statistically significant improvement in both the groups ($p < 0.0001$). But analysis between control and experimental group

for cervical flexion ($p = 0.3184$; t value= 1.011) and extension ($p = 0.3126$; t value= 1.023) was not statistically significant. On contrary, the pre and post value of both the groups for lateral flexion (Rt and Lt) and rotation (Rt and Lt) showed statistically significant improvement ($P < 0.0001$). But the inter group analysis between both the groups showed that addition of SCS technique improved the outcomes remarkably as compared to conventional treatment alone ($P < 0.0001$ & t value for lateral flexion Rt. = 7.451, Lt. = 6.116; t value for rotation Rt.=9.359, Lt.= 9.211)

The improvement in control group might be because of increase in muscle length caused by sustained stretch given to the muscle spindle [15]. When sustained stretch is applied on a muscle, there is mechanical disruption of the cross-bridges as the filaments slide apart, leading to abrupt lengthening of the sarcomeres. Upper trapezius muscle is mainly associated with cervical rotation and lateral flexion [18]. The automatic resetting of the muscle fibers done by application of SCS technique might be the reason of improvement in cervical rotation and lateral flexion in experimental group.

Graph 2 shows functional disability on **Neck Disability Index** is evidently improved in both the groups control ($p < 0.0001$) as well as experimental ($p < 0.0001$) but it was found to be more statistically significant in experimental group ($p < 0.0001$, U= 46). The reason for this statistically significant improvement must be reduction in pain and improvement in cervical range of motion. As this improvement was more in experimental group, NDI score of experimental group showed remarkable change.

The limitation for this study was that the pain pressure threshold was not measured because of unavailability of pressure algometer. This study can be performed with longer duration. It can be done in other field as well as other age group and gender.

CONCLUSION

Strain counter strain technique along with conventional treatment is effective in relieving pain & improving cervical lateral flexion and rotation ROM in students with upper trapezius trigger points.

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