Original Article

Effects of Conventional Physical Therapy with or without Strain Counterstrain in Patients with Trigger Points of Upper Trapezius; a Randomized Controlled Clinical Trial

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Abstract

Background: Non-specific neck pain has potential contributing factors. One of the factors being emphasized in the modern era is the Myofascial trigger points in the upper trapezius muscle. These could be treated by strain counterstrain method whose effectiveness needs to be evaluated. Hence, the objective of the study was to compare the effects of conventional Physical therapy with or without strain counterstrain in patients with trigger points of upper trapezius muscle.

Patients and Methods

It is randomized controlled clinical trial.

48 patients with treatment group A (24 patients) and control group B (24 patients).

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Patients with non-specific neck pain, having active myofascial trigger points in upper trapezius muscle presented to physical therapy department. Effects of interventions were recorded on neck disability index, visual analogue scale and cervical range of motion goniometer.

Results of this study using repeated measure ANOVA demonstrated that within group from day 1 to 7, there was mean reduction of pain by 32.13 (26.99, 37.27) in conventional physical therapy group with Strain counterstrain group (group A) and conventional physical therapy only group (group B) by 12.62 (8.28, 16.96). Less significant improvement was seen within groups for day 1, 4 and 7 in cervical range of motion. There was significant improvement seen in pain, neck disability index and neck range of motions on day 7 between group A and B measured by independent sample t test.

Conclusion: Conventional physical therapy with strain counterstrain was found effective in reducing pain, functional disability and improving range of motion at cervical region.

Key words: Myofascial trigger point, upper trapezius, randomized controlled trial, conventional physical therapy.

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Contribution

All Authors have contributed in Study Design, Data Collection, Data Analysis, Data Interpretation, Manuscript Writing and Approval.

Introduction

Non-specific neck pain is placing large economic burden on health system which can result in severe disability.[1] A pilot survey in Pakistan on computer users showed that 27.7% had radiating and localized neck pain.[2] One of the sources of non-specific neck

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pain is Myofascial trigger points (MTrPs), seen in the muscle and fascia. They are hypersensitive taut bands in skeletal muscle, painful when compressed and give specific pain patterns away from the source.[3]

To identify the trigger points, an examiner uses palpation method with the help of pulp of thumb and index finger. A liniment can be used to liquefy the area and localize the trigger point. The MTrPs gives specific local twitch response when stimulated with dry needle, clinical signs of tenderness when palpated and/or decrease in range of motion (ROM) of the region. Myofascial trigger points need skills in identification of the point, background knowledge and clinical practice of the examiner.[4]

From different treatment methods on the Myofascial trigger points, Strain counterstrainis one of the treatment approaches whose effectiveness need an evaluation on scientific grounds. It is an osteopathic technique used by physical therapists and osteopaths, defined as "the passive specific positioning of patient and affected region by the physical therapist for 90 seconds that would reduce the sensitivity of trigger point".[5] The specific positioning of the upper trapezius is ipsilateral side flexion, contralateral rotation, ipsilateral shoulder abduction and external rotation. The position is maintained for 90 seconds.

In the present prospect and knowledge found in some databases i.e. PUBMED, Google Scholar, CINHAL and DOAJ, there is hardly any study found in the region addressing the effectiveness of strain counterstrain compared with conventional physical therapy. In addition, preliminary data is not available to find out impact of conventional physical therapy (CT) with strain counterstrain (SCS) on mobility and pain intensity and functional disability in nonspecific neck pain patients with trigger points.

Patients and Methods

It is randomized controlled clinical trial.

Data was collected from Physical Therapy and Rehabilitation Clinic.

Sample size of 48 subjects (24 in each group) was taken using 5% level of significance and 95% power of test, two tails and effect size 1.1[6] using G*power 3.1.7 software and patients with non-specific neck pain patients having active Myofascial trigger points in upper trapezius muscle were included.

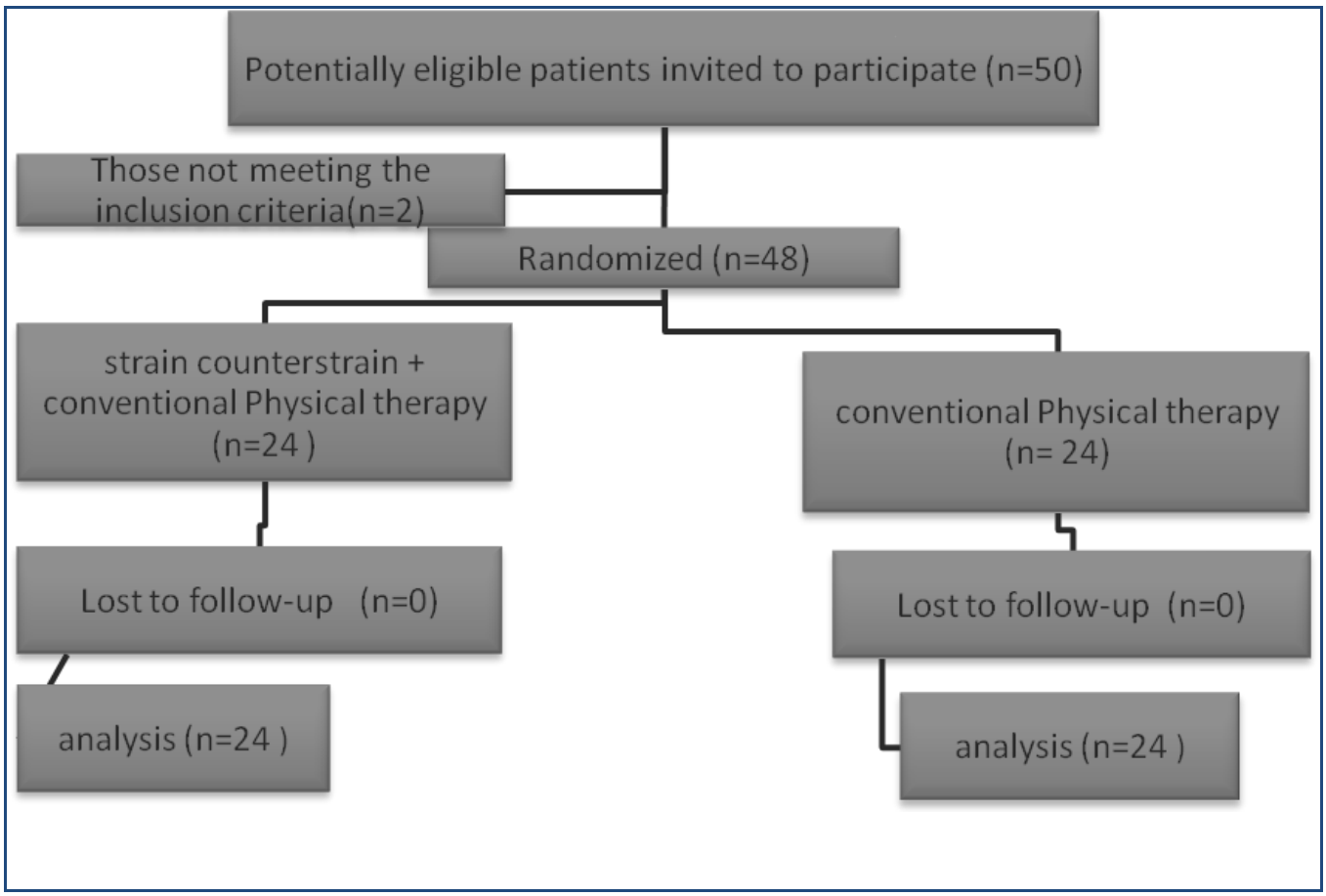
Informed consents were taken from the patients. For the randomization and concealment, the sequencing was generated randomly by the researcher with the help of a software online and simple (unrestricted) randomization was done. Also, according to the guidelines of Doig and Simpson, sequentially numbered, sealed, opaque envelopes were prepared.[7] Random allocation and concealment were maintained according to CONSORT Statement.[8] After including the patient into the study, the subject met the outcome assessor for the baseline measurements. After the measurements, the patient received a sealed envelope with the corresponding code no. and, met the researcher who then opened the envelope and provide the allocated treatment (either SCS with CT or CT only). The patient met the assessor again to get pre-treatment measurement on day 4th. Lastly, the patient came on the 7th day for the final measurement and no treatment was given on that day. Treatment was given on day 1stand day 4th only.

There were two groups in the study named as group A (24 subjects) and group B (24 subjects). Group A received Conventional Physical therapy and Strain counterstrain for 1 week. Group B received conventional Physical therapy only for 1 week.

For SCS, The subjects were in a sitting position on the chair and upper extremities were relaxed. The therapist used ultrasound gel to liquefy the area and pincer palpation to localize the trigger point. Once MTrPs found, the researcher started applying pressure to the area until the sensation identified the Myofascial trigger point. The position of comfort for applying strain counterstrain technique was ipsilateral side flexion, contralateral rotation and slight ipsilateral upper limb abduction. This position was maintained for 90s. Finally, the subject was slowly placed into a neutral position.

For Conventional Physical therapy, range of motion exercises and advice (as described in literature) was administered to the patient. The general range of motion exercise plan and advice were taken from Chartered Society of Physiotherapy.[9]

Data was collected through pre-designed proforma and then analyzed using the SPSS 21 statistical software. For quantitative data, descriptive statistics including mean ± standard deviation (S.D.) were calculated. The statistical differences between two groups were compared with the independent samples t-test. The difference within the group was calculated using the repeated measure ANOVA. The statistical significance was set at 5% and confidence level at 95%. Effect size was used to measure the magnitude of a treatment effect within the group between day 1st and 7th.



A standard set of tests was used in this study i.e. Cervical Goniometer for Cervical range of motion measurement, Neck Disability Index (NDI) for measurement of disability due to neck pain and Visual Analogue Scale for pain intensity measurement which is a blank line of 100 mm.[1,10,11]

Table 1.1: Gender distribution Of Study Subjects.

Variables		Strain Counter-Strain (n)	Conventional (n)	P-value
Gender	Male	12	13	< 0.05
	Female	12	11	

Results

The mean age of the patients in strain counterstrain and conventional physical therapy (group A) was 26.9 ± 4.65 years and group B (conventional physical therapy) was 26.5 ± 5.7 yrs. There were 12 males and 12 females in group A and 13 males and 11 females in group B. Among 48 patients, 66.7% had unilateral and 33.3% had bilateral non-specific neck pain (Table 1). Baseline values in group A and B for VAS, NDI, cervical flexion, extension, rotation and side flexion have been given in table 1 with $p > 0.05$ representing both groups were similar at baseline. Table 2 presents between – group difference on day 4thand day 7th. On

Table 1.2: Strain Counter – Strain versus Conventional Physical Therapy Group.

Variables		Strain Counter-Strain	Conventional	P value
Site of Neck Pain.	Unilateral.	15	17	< 0.05
	Bilateral	9	7	
History of neck Pain.	Yes	16	17	
	No	8	7	

Table 1.3: Strain Counter – Strain versus Conventional Physical Therapy Group.

Variables	Strain Counter Strain	Conventional	P Value
Working Hours	6.5 ± 2.7	7.1 ± 1.9	P > 0.05
Neck Pain (VAS)*	59.32 ± 7.56	60.15 ± 7.00	
Neck disability index.*	23.5 ± 3.06	22.2 ± 2.85	
Flexion	42.6 ± 5.37	38.58 ± 8.55	
Extension	46.08 ± 8.6	42.8 ± 11.1	
Rotation	72.9 ± 7.5	70.42 ± 4.31	
Side – Flexion	74.0 ± 7.9	70.50 ± 8.5	

*Data are mean ± SD except for gender. No difference between groups P > 0.05. †Measured with an 100 point Pain rating scale with 0 represent no pain to 100 represent worst pain ‡range of scoring is from 0 to 50 with value increasing represent greater disability.

Table 2: Day 4th and day 7th between-group change scores for neck pain, cervical range of motion and Neck disability index.

Outcome/Group		Day 4th mean ± SD	Between-Group Change Score (Day 4th)	P value Day 4th	Day 7th Mean ± SD	Between Group Change Score (Day 7th)	P value Day 7th
Visual Analogue Scale	SCS, CT	34.5 ± 8.21	-18.5 (-22.39, -14.60)	P < .05	27.1 ± 5.19	-20.34 (-23.19, -17.49)	P < .05
	CT	53.0 ± 7.20			47.53 ± 4.60		
Cervical Flexion	SCS, CT	41.6 ± 6.60	1.50 (-2.1, 5.10)	P > .05	46.3 ± 4.67	3.053 (1.70, 8.3)	P < .05
	CT	40.1 ± 5.72			1.25 ± 6.52		
Cervical Extension	SCS, CT	50.2 ± 7.20	4.29 (0.91, 7.67)	P < .05	53.42 ± 6.8	7.1 (3.67, 10.5)	P < .05
	CT	45.9 ± 3.97			6.3 ± 4.93		
Cervical Rotation	SCS, CT	76.8 ± 10.1	4.5 (-0.34, 9.34)	P > .05	2.6 ± 6.68	7.0 (3.5, 10.48)	P < .05
	CT	72.3 ± 6.00			75.6 ± 5.23		
Cervical Side Flexion	SCS, CT	82.1 ± 8.01	8.46 (2.66, 14.26)	P < .05	84.08 ± 13.2	9.25 (2.99, 15.5)	P < .05
	CT	73.7 ± 11.6			74.8 ± 7.56		
Neck Disability Index	SCS, CT	16.6 ± 1.31	-3.87 (-4.82, -2.93)	P < .05	14.5 ± 1.64	-4.8 (-5.96, -3.6)	P < .05
	CT	20.5 ± 1.88			19.37 ± 2.22		

day 4th, significant difference ($p < 0.05$) was found in VAS, NDI, cervical extension and side flexion but insignificant results in cervical flexion and rotation. On day 7th, there was significant improvement in VAS, NDI, neck flexion, extension, rotation and side flexion in SCS +CT group compared to CT group.

Within group difference from day 1st, 4th to 7th, values are compared for both groups from day 1st to 4th day, day 1st to 7th day, day 4th to 7th day as shown in table 3. In group A (SCS + CP), significant results ($p < 0.05$) were seen for all three days for VAS and NDI. For cervical flexion, insignificant results ($p > 0.05$) were seen. In cervical extension and rotation, only significant difference was seen from day 1st to 7th but insignificant results from day 1st to 4th day and day 4th to 7th day. For side flexion, $p<0.05$ found from day 1st to 4th day and day 1st to 7th day but $p > 0.05$ from day 4th to 7th day.

In group B, significant results ($p < 0.05$) were seen for all three days for VAS. For NDI, $p > 0.05$ for day 1st to 4th day and $p < 0.05$ for day 1st to 7th day and day 4th to 7th day were seen. For cervical flexion, extension and side flexion, insignificant results ($p > 0.05$) were seen for all days. In case of cervical rotation, insigni-

ficant results were found from day 1st to 4th day and day 4th to 7th day but significant from day 1st to 7th day as seen .Effect size has been shown to explain the degree of improvement seen with treatment provided. The interpretation of effect size is considered as 0.2 is small but not trivial, 0.5 is medium and 0.8 is large effect size.

Discussion

The upper trapezius muscle plays an important role in the stability and mobility of the neck region. The formation of trigger points in upper trapezius gives rise to specific pain patterns either in the neck, shoulder and upper limbs. Furthermore, the trigger point development is supported by the hypothesis that some motor units remain excited after overuse or injury. These excited muscle fibers can be treated using the treatment method of Strain counterstrain described by Jones.

In the present study, effect size of the treatment group A was large in the variables of VAS and NDI but moderate in other variables of ranges of motion compared to the control group B having mild effect size. Between group comparison had shown significant difference using p-value < 0.5 indicating the effectiveness of Strain counter strain along with conventional physical therapy. These results were consistent with the studies by Klein et al., Hou CR et al. and F. Okhovatian et al. that SCS may be an effective treatment for upper trapezius muscle.[1,12,13] Different studies measured its effectiveness either as a sole treatment or combination with other specific techniques i.e. muscle energy techniques, longitudinal stroking andischemic compression.[5,10]

A study by F. Okhovatian et al. in 2012 on strain counterstrain conducted a Randomized trial, found strain counterstrain an effective treatment technique in reducing neck pain and improving pain threshold measured by VAS and pain pressure threshold instrument (PPT) respectively.[13] The results were consistent with the present study in case of VAS. Their study measured only three variables i.e. VAS, PPT and effect size but present study measured VAS, cervical range of motion, neck disability index and effect size. Effect size calculated in both studies found moderate to large effect size for VAS in group A compared to group B with mild effect size.

Pain pressure threshold instrument was not used by the researcher due to non-availability and cost. The diagnosis of trigger point in present study was based on a subjective method rather than any objective visualization tool. Recent advances used pressure algometer to measure specific pressure and magnetic resonance elastography to visualize trigger or tender point.[14-16]

The physiologic mechanism of strain counterstrain is still practically unproven although theoretical clinical reasoning is present to explain its physiology. Strain counterstrain work by automatic resetting of the muscle spindle.[1] It changes tone and neuromuscular activity of the muscles.[6] Still, it might be possible that pain relief of the muscle was due to patient relaxation with breathing during treatment and consciousness.

The present study concludes that conventional physical therapy and strain counterstrain is moderately effective in reducing pain, functional disability and improving range of motion at cervical region than conventional physical therapy alone in patients with trigger point of upper trapezius. These results actively contribute to the growing body of knowledge and evidence in supporting the use of strain counterstrain as part of treatment of Myofascial trigger points.

The focus of the study was on the upper trapezius muscles. There are other muscles needed to be considered in the posterior neck region where trigger points can be developed in different fibers. Also, it is required to find out that these trigger points are in slow twitch or fast twitch fibers and what are the numbers of trigger or tender points in one or group of muscles.

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