

ORIGINAL ARTICLE

Comparative Effects of Strain Counterstrain and Ischemic Compression Technique in Patients with Upper Trapezius Trigger PointsSAMRA SALEEM¹, SEHAR ZAHID CHAUDHRY², MUHAMMAD USAMA SOHAIL³, RAMISH SALEEM⁴, HIRA RAFIQUE⁵, FARWA BATOOL⁶, ATIF ALI ATTAR⁷, SANA SHAH⁸¹Demonstrator Physical Therapy The University of Faisalabad (TUF)²Ex- Clinical Physiotherapist Maqbool lifecare centre³Lecturer Physical Therapy PSRD College of Rehabilitation Sciences⁴Lecturer Department of Rehabilitation Sciences The University of Faisalabad (TUF)⁵Senior Lecturer Quaid-e-azam Educational Complex Sahiwal⁶Student MSPT University of Lahore (UOL)⁷Lecturer Bhattai Institute of Physiotherapy and Rehabilitation Sciences Mirpurkhas⁸Physiotherapist Humanitarian Assistance and Women Welfare Association (HAWWA)Corresponding author: Samra Saleem, Email: samra_saleem14@yahoo.com**ABSTRACT**

Background: The trigger points are hyperirritable spots found usually in the muscle fascia or within the taut bands of skeletal muscles that is painful on compression. Ischemic compression technique uses the application of sustained pressure with sufficient force and for long enough so as to slow down the flow of blood and releasing tension out of the muscle. Strain counterstrain (SCS), also known as positional release, is a passive positional treatment that relieves musculoskeletal pain and dysfunction by indirect hand manipulation.

Objectives: The aim of this study was to compare the effects of ischemic compression technique and strain counterstrain technique on pain, neck lateral flexion and disability in patients with upper trapezius trigger points.

Methodology: The RCT was conducted on 36 male and female participants aging 25-45 having maximum of 5 trigger points in the upper trapezius bilaterally. The patients were divided equally to ischemic compression and strain counterstrain group by lottery method. The treatment was given for 3 days a week for 4 weeks. The NPRS, NDI and cervical lateral flexion were used as outcome measure. The assessment of the outcome measures was done on baseline, after 2nd week and after 4th week. The data was analyzed by SPSS version 26 using appropriate tests depending upon the normality by keeping the level of significance at 0.05.

Results: Out of 36 participants (Mean age 32.96 ± 5.91), 20 were male and 16 were female, 3 participants lost to follow up. The within group analysis of NPRS and NDI done by Friedman test and that of cervical flexion done by repeated measures ANOVA showed that the both the interventions has produced significant ($p < 0.05$) effects on pain, neck disability and range of motion, but the between group analysis of NPRS and NDI done by Mann-Whitney test and that of Cervical ROM done by Independent samples t-test showed that none of the two technique produced significant results ($p > 0.05$) as compared to the other in subjects with upper trapezius trigger points.

Conclusion: A 4-week intervention of the ischemic compression and strain counterstrain produced significant results in reducing the intensity of pain, the cervical disability and improving the cervical range of motion, but the intergroup comparison showed that both the ischemic compression and strain counterstrain were equally effective and none of them produced significant results as compared to others on patients with upper trapezius trigger points.

Keywords: Ischemic Compression Technique; Strain Counterstrain; Upper Trapezius Trigger Points.

INTRODUCTION

Trigger points are hyperirritable spots found mostly in the muscle fascia or within the taut bands of skeletal muscles that are painful on compression or on stretch and can originate characteristic-referred pain, and typical motor (muscle weakness, restricted range of motion), sensory (local tenderness, pain referral) and autonomic phenomena(1). Trigger points are classified as active and latent trigger points on the basis of pain intensity and clinical characteristics. Active trigger points cause pain and tenderness on rest and produce referred pain which occur remotely from the site of trigger point. The latent trigger point doesn't spontaneously or voluntarily produce pain but may cause muscle fragility and movement restriction.(2) Pain is frequently described as radiating or spreading. A important feature of a trigger point is the referred pain which distinguishes a trigger point from tender point that causes pain only at the site of palpation(3).

Trigger points are a source of dysfunction, manifesting as muscle shortening, weakness, difficulty relaxing, poor coordination, irritation, and longer time to recover. Trigger points are called by the events that cause them to occur. Trigger points, which are the fundamental cause of myofascial pain syndrome, cause patients to experience agonizing pain & muscular stiffness. Patients may suffer burning, throbbing, stabbing, or severe pain in acute conditions.(4)

Trigger points are associated with the cervical impairment and are common in mechanical neck pain.(5) Neck pain is one of the leading health concerns and it affects 45-54% general population, & on average 4.5 trigger points are exhibited by an

individual with mechanical neck pain and the greater incidence is found in the trapezius muscles(6). The women are more prone to develop trigger points as compared to men and the middle aged people are mostly affected.(7)

The frequency of myofascial trigger points in the upper trapezius muscle among the physiotherapists of Karachi was found to be 70.5 percent, in a sample of 258 physiotherapists from Karachi, 182 had latent myofascial trigger points in the upper trapezius and the factors associated with this higher prevalence was lack of good posture, sleep deprivation and psychological stress.(8)The prevalence of myofascial trigger points among the neck and shoulder patients was assessed by conducting a review of 5 studies which indicated high prevalence in neck and shoulder region.(9)

Apart from pharmacological treatment techniques such as massage, acupressure, acupuncture, the application of heat or cold, osteopathic manual medicine treatments, and ultrasound are used to treat myofascial trigger points.(10)

Ischemic compression technique uses the application of sustained pressure with sufficient force and for long enough so as to slow down the flow of blood and releasing tension out of the muscle.(11) This temporary block of the blood supply helps flushing the inflammatory exudates and pain metabolites out of the muscle resulting in breaking down of the scar tissue and reduction of muscle tone. Once the pressure is removed blood flow rushes to the area resulting in deactivation of the trigger point(12).

Strain counterstrain (SCS), also known as positional release, is a passive positional treatment that relieves musculoskeletal pain

and dysfunction by indirect hand manipulation.(13) SCS is widely utilized in orthopedic patients to alleviate pain, local edema, fascial tension, joint hypomobility, muscle dysfunction, muscular spasm, and weakness. After soft tissue methods, high velocity low amplitude thrust, and muscle energy technique, Strain Counter Strain is the fourth most often utilized osteopathic manipulative technique.(14)

The effects of ischemic compression technique are found to be beneficial for the trigger points but mostly single session / weekly effects of this technique have been considered by evidence. The strain counterstrain has been used to treat different musculoskeletal conditions, but due to difference in population of study and the outcome measures, there is a lack of rigorous evidence that compares the effects of ischemic compression technique and strain counterstrain technique in deactivating the upper trapezius trigger points, so the rationale behind carrying out this research is to compare relatively long -term (4 weeks) results of ischemic compression and strain counterstrain technique using highly reliable and valid outcome measures in releasing upper trapezius trigger points.

MATERIALS AND METHODS

The present research was a single-blinded Randomized control trial carried out on 36 participants at Sania Physio Care Clinic and Balqees Memorial Rehab Clinic Faisalabad in a duration of 4 months following the approval of ethical committee and informed consent from the participants.

The participants were selected by using convenient sampling techniques and were then divided in to 2 groups, Ischemic compression group and Strain counterstrain group using lottery method where the selection of participants into groups depends upon the card drawn and the specific number assigned to participants. The inclusion criteria of participants was, any gender of age between 25-45, having minimum 5 trigger points on upper trapezius bilaterally and had complaints of neck pain from 3 months and having NPRS score of 3-7.(15)

Participants having neck pain secondary to any musculoskeletal disorder or any kind of malignancy and whiplash injury and those who had myofascial trigger point release in last 1 month were excluded from the study.

Numeric pain rating scale was used for the assessment of pain, the standardized goniometers were used to measure the cervical range of motion and neck disability index was used to assess the neck disability among the participants of upper trapezius trigger points.

The exercise and follow up plan were provided to the patients depending upon their respective group. The baseline treatment was given to the patients prior to the group respective treatment which included application of moist heat pack applied over shoulders to cover Trapezius area for 10 minutes.(16) Treatment duration was 3 sessions per week for 4 weeks. The data was collected by the physiotherapist using the questionnaire and the data for the neck pain, cervical ranges of motion & NDI was measured at baseline then after 2 weeks (6th session) and lastly after 4th week (12th session).

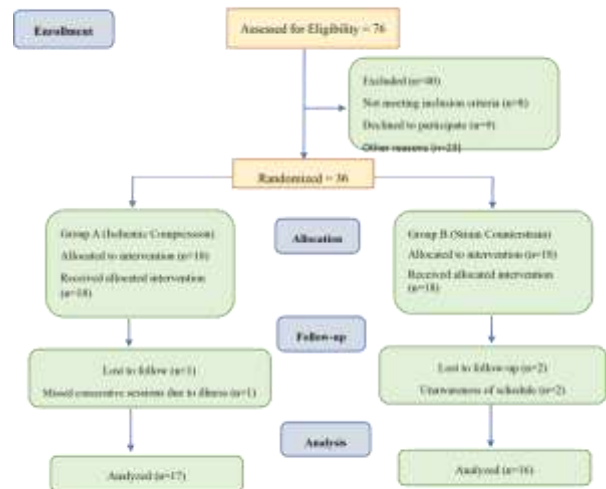
Group A (Ischemic Compression Group): The active trigger points were examined and marked on skin with the marker, therapist used a pincer hold in this method, putting the index finger and thumb over the active trigger points. The pressure was applied until a relaxation of the tissue barrier is felt. The pressure was administered intermittently at first, then constantly for 90 seconds, depending on tolerance of patient. This was continued for all trigger points and was repeated once again for all trigger points. The ischemic compression along with the baseline treatment took 45 minutes.(15)

Group B (Strain Counterstrain Group): The relaxed position was maintained by putting the muscle in a shortened position. Position of ease is defined as the point at which there is a pain decrease of at least 70%. To alleviate the stated trigger point discomfort, the patient was positioned supine while the practitioner positions the

ipsilateral arm in flexion, abduction, and external rotation. Once the position of ease has been determined, pressure was given to the trigger point and maintained for 90 seconds and repeated for 2 times for all trigger points. The strain/counterstrain and baseline treatment take 45 minutes. (17)

Statistical Analysis: SPSS version 26 was used for the analysis of data. Descriptive statistics as mean ± S.D was used to summarize the continuous variables. The normality of data was assessed by Shapiro-Wilks test, the NPRS and NDI were found to be violating the assumptions of normal distribution so, non-parametric test i.e., for within group analysis Friedman test and for between group analysis Mann-Whitney U test were applied. The cervical lateral flexion was found following normal distribution so parametric tests i.e., for within group analysis Repeated measures ANOVA and for between group analysis Independent Samples t-test were applied.

Consort Flow Diagram



RESULTS

The age of the participants was categorized into 4 groups, 41.7% participants were lying in the 25-29 years category, 19.4% participants were lying in the 30-34 years category, 22.2 % participants were lying in the 35-29 years category and the rest 16.7 % participants were lying in the 40-45 years category. The mean age of the participants was 32.96 ± 5.91 years. Out of 36 participants 20 (55.5%) were male and 16 (44.4%) were females. (Table 1)

Table 2 specifies the within group A analysis of Numeric Pain Rating scale, Neck Disability index and cervical lateral flexion on both sides. The mean of NPRS at baseline was 4.94 ± 1.29 and the mean of NPRS after 4th week was 0.7647 ± 1.03. For NDI , the mean at baseline was 25.64 ± 5.89 and after 4th week was 9.23 ± 4.64. For left lateral flexion within group A analysis, the data shows that the mean of left lateral flexion before the intervention was 24.76 ± 3.61 degrees and post intervention it was 32.52 ± 3.59 degrees. For right lateral flexion the mean of right lateral flexion before the intervention was 25.29 ± 3.80 degrees and post intervention it was 33.41 ± 3.33 degrees.

The table shows that the significance value of NPRS, NDI and Cervical Lateral Flexion(Right & Left) below 0.05 i.e., p=0.001 for all, which means that ischemic compression has reduced the pain by 4.18 points as assessed by numeric pain rating scale, reduced the neck disability by 16.43 points as assessed by neck disability index, brought an improvement of 7.76 degrees in the left lateral flexion while 8.12 in right lateral Flexion in patients with upper trapezius trigger points

Table 3 specifies the within group B analysis of all the four Outcome measures i.e NPRS, NDI and Cervical Lateral Flexion(Right & Left) . Table 2 specifies the within group A analysis of Numeric Pain Rating scale, Neck Disability index and cervical lateral flexion on both sides. The mean of NPRS at baseline was 5.0000 ± 1.59 and the mean of NPRS after 4th week was 0.8750 ± 0.957. For NDI , the mean at baseline was 24.87 ± 4.80 and after 4th week was 8.87 ± 4.85. For left lateral flexion within group A analysis, the data shows that the mean of left lateral flexion before the intervention was 23.81 ± 3.37 degrees and post intervention it was 31.6 ± 3.11 degrees. For right lateral flexion the mean of right lateral flexion before the intervention was 23.8 ± 3.01 degrees and post intervention it was 31.6 ± 3.28

The table shows that the significance value of NPRS, NDI and Cervical Lateral Flexion(Right & Left) below 0.05 i.e., p=0.001(NPRS) & p=0.000 for the rest, which means that strain counterstrain has reduced the pain by 4.125 points as assessed by numeric pain rating scale, reduced the neck disability by 16.00 points as assessed by neck disability index, brought an improvement of 7.81 degrees in the left lateral flexion while 7.79 degrees in right lateral Flexion in patients with upper trapezius trigger points

Table 1: Demographic data

Age	Frequency	%age
25-29 Years	15	41.7
30-34 Years	7	19.4
35-39 Years	8	22.2
40-45 Years	6	16.7
Gender		
Male	20	55.6
Female	16	44.4
TOTAL	36	100.0

Table 2: With in Group A Analysis of NPRS, NDI and Cervical Lateral Flexion

Numeric Pain Rating Scale (Friedman test)			
N= 17	Mean	SD	P-value
NPRS at Baseline	4.9412	1.29762	0.001
NPRS after 2nd Week	2.7059	1.72354	
NPRS after 4th Week	1.7647	1.03256	
Neck Disability index (Friedman test)			
NDI at Baseline	25.6471	5.89429	0.001
NDI after 2nd Week	14.8235	5.74712	
NDI after 4th Week	9.2353	4.64394	
Cervical Left Lateral Flexion (Repeated measures ANOVA)			
Lateral Flexion to Left at Baseline	24.7647	3.61472	0.001
Lateral Flexion to Left after 2nd Week	28.8235	3.82811	
Lateral Flexion to Left after 4th Week	32.5294	3.59022	
Cervical Right Lateral Flexion (Repeated measures ANOVA)			
Lateral Flexion to Right at Baseline	25.2941	3.80402	0.000
Lateral Flexion to Right after 2nd Week	29.2353	3.56247	
Lateral Flexion to Right after 4th Week	33.4118	3.33652	

Table 3: With in Group B Analysis of NPRS, NDI and Cervical Lateral Flexion

Numeric Pain Rating Scale (Friedman test)			
N= 16	Mean	SD	P-value
NPRS at Baseline	5.0000	1.59164	0.001
NPRS after 2nd Week	2.8750	1.36015	
NPRS after 4th Week	1.8750	1.95743	
Neck Disability index (Friedman test)			
NDI at Baseline	24.8750	4.60254	0.000
NDI after 2nd Week	15.0000	4.93964	
NDI after 4th Week	8.8750	4.85627	
Cervical Left Lateral Flexion (Repeated measures ANOVA)			
Lateral Flexion to Left at Baseline	23.8125	3.37083	0.000
Lateral Flexion to Left after 2nd Week	27.6875	3.30088	
Lateral Flexion to Left after 4th Week	31.6250	3.11716	
Cervical Right Lateral Flexion (Repeated measures ANOVA)			
Lateral Flexion to Right at Baseline	23.8215	3.01593	0.000
Lateral Flexion to Right after 2nd Week	27.6875	3.47791	
Lateral Flexion to Right after 4th Week	31.6150	3.28380	

For analysis between Group A and Group B, Mann Whitney U test was used for NPRS and NDI an independent T test for Lateral Flexion. The results specified that the P- value for pre-test and post test in NPRS, NDI and cervical Lateral Flexion (right & left) were grater then the significance value of 0.05 which means that there is no statistically significance difference in the results produced by ischemic compression and the strain counterstrain on pain as assessed by NPRS, NDI and cervical Lateral Flexion (right & left), which means that both the ischemic compression and strain counterstrain are equally effective on pain, neck disability and improvement in cervical ROM in patients with upper trapezius trigger points. (Table 4)

Table 4: Between Group Analysis

	Mann-Whitney U	Asymp. Sig. (2-tailed)		
Numeric Pain Rating Scale (Mann Whitney test)				
NPRS at Baseline	152.000	.747		
NPRS after 2nd Week	133.000	.686		
NPRS after 4th Week	123.500	.624		
Neck Disability index (Mann Whitney test)				
NDI at Baseline	149.000	.680		
NDI after 2nd Week	139.500	.863		
NDI after 4th Week	130.500	.842		
Cervical Left Lateral Flexion (Independent Samples test)				
	Groups	Mean	SD	P-value
Lateral Flexion to Left at Baseline	Group A	24.5556	3.61731	.616
	Group B	23.9444	3.62138	
Lateral Flexion to Left after 2nd Week	Group A	28.8235	3.82811	.264
	Group B	27.4118	3.39225	
Lateral Flexion to Left after 4th Week	Group A	32.5294	3.59022	.445
	Group B	31.6250	3.11716	
	Groups	Mean	SD	P-value
Lateral Flexion to Right at Baseline	Group A	25.0000	3.89570	.379
	Group B	23.9444	3.17105	
Lateral Flexion to Right after 2nd Week	Group A	29.2353	3.56247	.295
	Group B	27.9412	3.52616	
Lateral Flexion to Right after 4th Week	Group A	33.4118	3.33652	.131
	Group B	31.6250	3.28380	

DISCUSSION

The present study compared the effects of ischemic compression technique and strain counterstrain technique on pain, neck disability and cervical lateral flexion ROM in patients with upper trapezius trigger points. Both the groups had similar Demographic and clinical characteristics. The results of the study showed that both the techniques i.e. Ischemic compression and Strain counterstrain were equally effective in reducing pain, neck disability and improving Cervical ROM in patients having Upper trapezius Trigger points but upon intergroup comparison no significant difference was found between the effects of ischemic compression and strain counterstrain on upper trapezius trigger points.

The ischemic compression and strain counterstrain were found to be reducing pain in patients with upper trapezius trigger points which are similar to the results produced by Iqbal, and the colleagues where the ischemic compression and strain counterstrain not only reduced pain by visual analogue scale, but also reduced difficulty and increasing the pain threshold levels(18), but they had undertaken participants with unilateral trigger points and the present study has worked on the bilateral upper trapezius trigger points, so the results are more clinically applicable.

In contrast to previous study by Kumar et al. in 2015, that stated that ischemic compression and strain counterstrain were not effective on trigger points in comparison to muscle energy technique on pain, neck disability and cervical range of motion as assessed by visual analogue scale, neck disability index and the goniometers.(17) The present study had different results in a way that it has produced significant reduction in pain, neck disability and improved Cervical ROM.

The results of the present study are in line with study by Gohil, et al. in 2020 where the study resulted that both the strain counterstrain and the digital ischemic compression were effective in

treating pain, disability and increasing range of motion at neck and also the results were similar with the present study that both the intervention used were equally effective and there was no significant difference in the results produced by both interventions in patients with upper trapezius trigger points.(15)

According to the findings of the current study, the ischemia compression approach could provide analgesia and a reduction in pain through the following mechanism. Pain reduction via pressure therapeutic interventions may arise from reactive hyperemia with in trigger point region or a spinal reflex mechanism for the relaxation of muscular spasm. Both of these mechanisms might be responsible for the relief of pain.(19) The local application of pressure has the potential to reduce pain by bringing the length of the sarcomeres at the relevant trigger sites closer together. The tight bands may respond favorably to effective stretching and mobilization if deep pressure is applied.(20)

Since both Group A and Group B were given ischemic compression and strain-counterstrain in addition to the moist hot pack, the higher gain in pain relief and the increase in functional status may be attributed to the mechanism described above, which has been explained and supported by a variety of studies done in the past.(21-23)

Ischemia is a condition in which there is insufficient blood flow to tissue. When doing ischemic compression, the objective is to assign pressure on trigger points in a way that prevents blood from flowing into the afflicted region, so depriving that area of oxygen. This removes waste materials, provides the oxygen that is required, and assists in the repair of the tissue that is involved. Once the pressure is released the blanching of the skin occurs very quickly and is then followed by an improvement in perfusion, oxygenation, and nutrition at the location of the pressure.(24) Ischemic compression helps reduce the intensity of painful nodules in the muscle, which ultimately results in a reduction in the amount of pain experienced. Similar, results were sighted in the present study where the ischemic compression reduced the pain, disability and improved the cervical range of motion.(25)

CONCLUSION

A 4-week intervention of the ischemic compression and strain counterstrain produced significant results in reducing the intensity of pain, the cervical disability and improving the cervical range of motion, but the intergroup comparison showed that both the ischemic compression and strain counterstrain were equally effective and none of them produced significant results as compared to others on patients with upper trapezius trigger points.

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