IOSR Journal of Sports and Physical Education (IOSR-JSPE)
e-ISSN: 2347-6737, p-ISSN: 2347-6745, Volume 1, Issue 6 (Jul-Aug. 2014), PP 53-58
www.iosrjournals.org

Effectiveness of Strain Counterstrain Technique on Quadratus Lumborum Trigger Point in Low Back Pain

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Abstract: *Quadratus lumborum (QL) myofascial trigger points (MTrP) are well documented in low back pain (LBP) patients. There is a Growing body of evidence suggesting that Strain counterstrain technique (SCS) is an effective treatment for the pain associated with MTrP. Literature is sparse regarding the effectiveness of SCS on MTrP in QL in LBP subjects. We studied the immediate effects of SCS on pain intensity & functional outcome in subjects having LBP with MTrP in QL. 40 subjects were randomly allocated into two groups. The Control group (CG) received moist heat, & the Experimental group (EG) received moist heat & SCS technique. Outcome measures were Visual Analogue Scale (VAS) & Patient Specific Functional Scale (PSFS).Pain scores(VAS) Showed Statistically significant differences within the groups (P<0.0001), while clinically significant improvement was seen only in EG with mean difference (3.75) , 95% confidence interval (4.17,3.04), PSFS also showed significant improvement in EG.*

Keywords: *Quadratus lumborum, Myofascial Trigger Point, Pain, Low Back Pain, Strain Counterstrain*

I. Introduction:

Life time prevalence of low back pain (LBP) is widely reported to be 80%[1]and at any given point of time it affects between 4-33% of the population. Despite number of treatment modalities reported in the literature there is no single definitive treatment that has proven to be effective for LBP[2]. To overcome this problem recent research has focused on classifying LBP subjects into various homogenous subgroups[3]. MTrP with positive jump sign is mostly observed as a common cause for LBP[4, 5, 6, 7]. This can be considered as one of the important subgroup of LBP[8]. MTrPs are located in skeletal muscles and their fascia[5]. MTrP is a hyperirritable spot, associated with taut band of skeletal muscles and any compression or stretch to the muscle can cause localized or referred pain[9]. There is a strong evidence of QL being a major cause of LBP disorders which often develops active and latent MTrP[5, 7, 9, 10, 11]

QL muscle group plays a prominent role in normal body mechanics. This muscle group is composed of several small muscles that are located deep within the muscle mass of the lower back. The anatomists have accorded the role of coastal and vertebral attachments in the process of respiration and moving of lumbar spine respectively. QL probably helps to extend lumbar spine, causes lateral flexion and [12, 13] is also an important stabilizer of lumbar spine[14, 15, 16, 17].

A sustained contraction of QL is required during sitting, walking, lying, and other functional activities in order to stabilize the trunk and maintain body mechanics. Poor posture and body positioning alters the body mechanics which results in development of MTrP in this muscle[5].

There is a Growing body of evidence that suggests that Strain-Counter strain (S-CS) technique is an effective treatment for MTrP[18, 19, 20]. However literature is sparse regarding the effectiveness of S-CS on MTrP in QL in LBP patients. The S-CS technique is indirect manipulative technique to treat trigger points in the muscle, as its action for treatment moves away from the restrictive barriers, i.e. in the direction of ease [21]. It is accomplished by placing the tissues in an ideal position of comfort (POC). The purpose of POC is to reduce irritability of the tender point and normalize the tissue associated with the dysfunction[22]. The gentle and atraumatic nature of the S-CS techniques establishes it as a safe and effective primary mode of intervention in the treatment of painful muscles and the joints they influence[23]. The intervention to treat acute low back pain using S-CS technique can be considered as a form of spinal soft-tissue manipulative therapy because the pelvis, sacrum, and lower limbs are used in positioning of the lumbar spine and sacral regions passively in degrees of flexion, extension, lateral flexion, and rotation[8].

II. Materials &Methods

Participants-

Ethical approval was obtained from an institutional ethical committee before starting the research work. 50 low back pain subjects referred to physiotherapy outpatient department were screened for MTrP in QL muscle using the jump sign diagnostically. As per Simons et al criteria[9], 40 subjects were found to be positive for MTrP in QL muscle. An informed consent was taken from all the subjects. The baseline parameters were

assessed for pain and functions using Visual Analogue Scale and Patient Specific Functional Scale. One researcher was trained to diagnose the trigger point in LBP subjects.

MTrP Diagnosis

QL tender points are located on the lateral aspect of the transverse process from L I to L5. Pressure is applied anteriorly and then medially. The Researcher used his thumb and index finger to palpate (using pincer palpation) the muscle for:

1. Presence of a palpable taut band in a skeletal muscle;
2. Presence of a hypersensitive tender spot in the taut band;
3. Local twitch response provoked by the snapping palpation of the taut band.
4. Reproduction of the typical referred pain pattern of the MTrP in response to compression and
5. Jump sign

Subjects were excluded if they exhibited any of the following:

1. Absence of jump sign
2. Subjects having fracture or infectious disease of spine
3. Unwillingness for participation

Study Design

This study was a randomized control trial. After baseline assessment of pain intensity and functional outcome, subjects were randomized either in experimental group receiving Moist Heat and S-CS technique or control group receiving only Moist Heat. Pain Reassessment was done immediately post treatment.

Data Collection

Baseline parameters & outcome measures were assessed by same researcher to maintain the standardization.

Pain Assessment

Intensity of pain was measured using VAS. A 10 cm (100mm) line with markings 0 through 10 was drawn. Zero indicating no pain and 10 indicating maximum pain. The subjects were asked to rate their pain from 0 to 10 by marking on the line. This measurement was taken to record the intensity of pain accordingly.

Functional Outcome Assessment

Patient specific functional scale is used to assess the functional outcome. The patient is asked to identify activities that are difficult to perform because of their condition and rate each activity on a score of 0 - 10 with 0 denoting unable to perform activity and 10 denoting able to perform activity at the same level as before injury or problem[24].

Strain Counter-Strain Technique

Treatment positions for strain counter strain technique[22]:

The patient is prone with the trunk laterally flexed toward the tender point side. The therapist stands on the side of the tender point and places his/ her knee on the table then rests the patient's affected leg on his/her thigh. The patient's hip is then extended and abducted, and slightly rotated to fine-tune, this position was maintained for 90 sec. Post this the subject is passively placed in a relaxed position.

III. Results

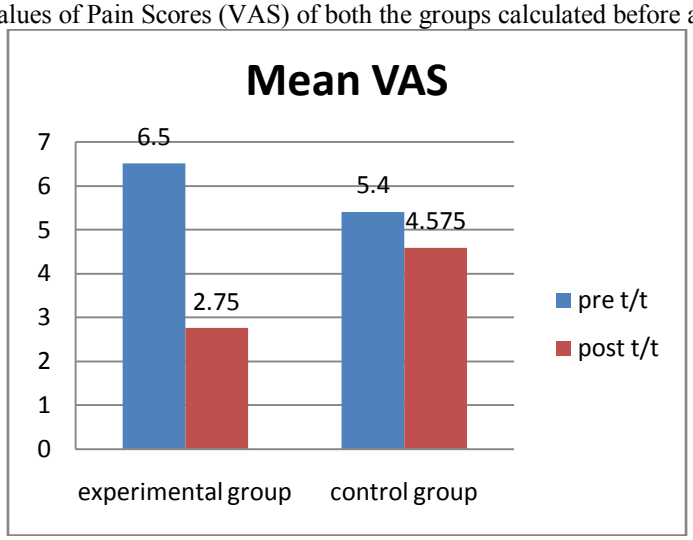
Fifty patients with nonspecific back pain were screened for inclusion criteria. 40 subjects were found eligible and were included in the study. Subjects were randomly allocated into two groups: experimental group (n=20, mean pre treatment VAS: 6.5, mean post treatment VAS: 2.75); control group (n=20, mean pre treatment VAS: 5.4, mean post treatment VAS: 4.575).

Paired t test was applied for the statistical analysis in each group & the P value for both experimental & control group between pre treatment& post treatment was found to be statistically significant ($p<0.005$). However mean difference calculated in experimental group is 3.75 was more clinically significant than that of control group which is 0.825. Also 95% confidence interval for the experimental group (4.176, 3.024) is highly clinically significant than that of control group (95% CI 0.59, 1.06) [25].

Table 1: Statistical Analysis of Experimental & Control group

T-test: Paired two sample for means	Experimental Group		Control Group	
	PRE VAS	POST VAS	PRE VAS	POST VAS
Mean	6.5	2.75	5.4	4.575
Mean difference	3.75		0.825	
t-stat	15.67449		7.46991	
P value	2.53E-12 (<0.0001)		4.59E-07 (<0.0001)	
95% confidence interval	4.176 , 3.024		0.59 , 1.06	

Graph 1: Mean values of Pain Scores (VAS) of both the groups calculated before and after treatment



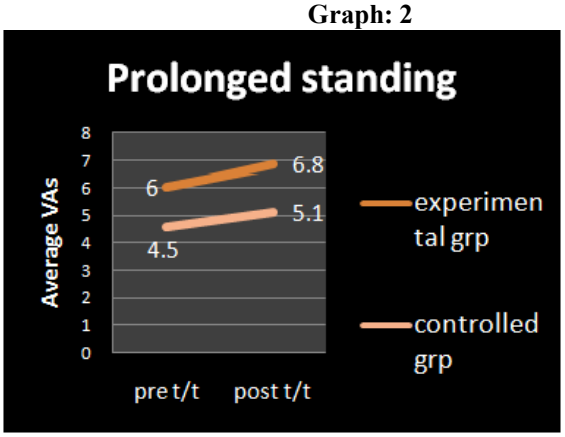
Patient Specific Functional Scale

Functional outcome was assessed using PSFS. 10 commonly affected functions were included and mean of each variable was calculated before and after the treatment. Graphical analysis showed significant improvement in functions of subjects in experimental group than compared to control group.

Table 2:

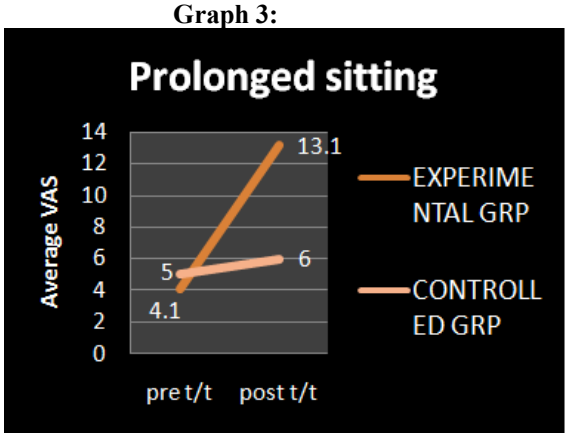
Activities	Experimental group(mean)		Control group(mean)	
	Pre treatment	Post treatment	Pre treatment	Post treatment
Prolonged sitting	4.1	13.1	5	6
Prolonged standing	6	6.8	4.5	5.1
Forward bending	4.8	7.2	4.3	5.4
Backward bending	4.6	8	5.5	6.5
Side bending	5.2	8.2	4.9	5.5
Walking	4.1	7.1	3.3	4
Squatting	5	8.3	4.6	5.7
Washing clothes	4	6.6	3	4
Climbing stairs	4	8	4	4.6
Lifting/dragging heavy wt	5	8	5	5.7

Graph: 2



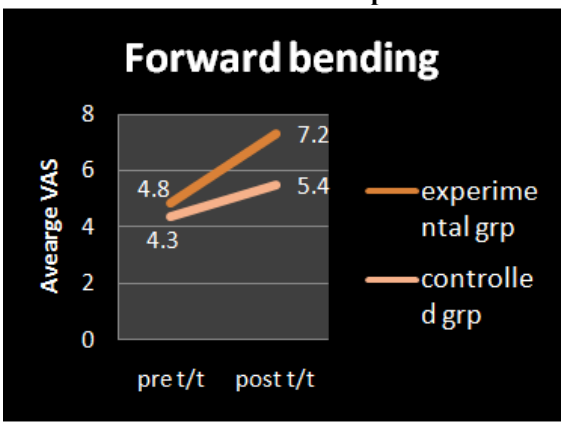
Graph 3: Represents the improvement in the activity (Prolonged Standing) in both the groups

Graph 3:



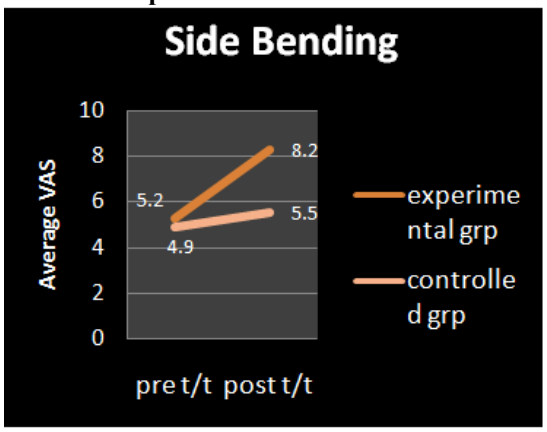
Graph 2: Represents the improvement in the activity (Prolonged Sitting) in both the groups

Graph 4:



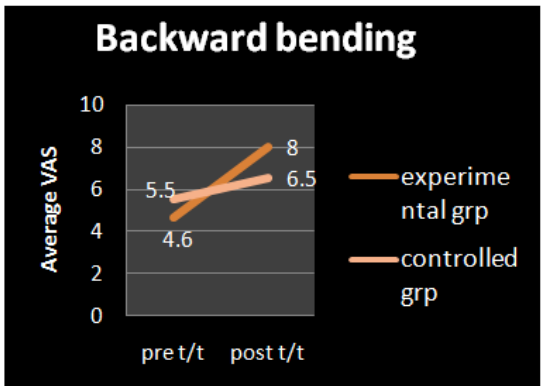
Graph 4: represents the improvement in the activity (Forward Bending) in both the groups

Graph 6:



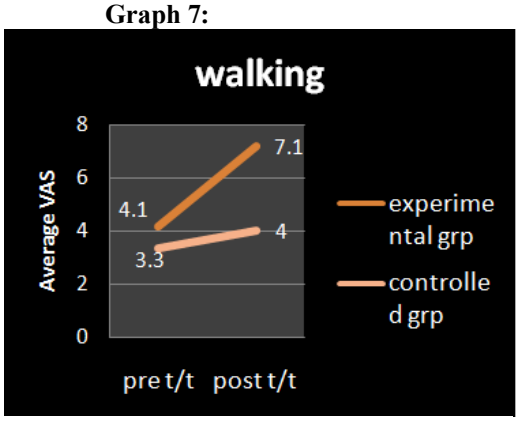
Graph 6: Represents the improvement in the activity (Side Bending) in both the groups

Graph 5:



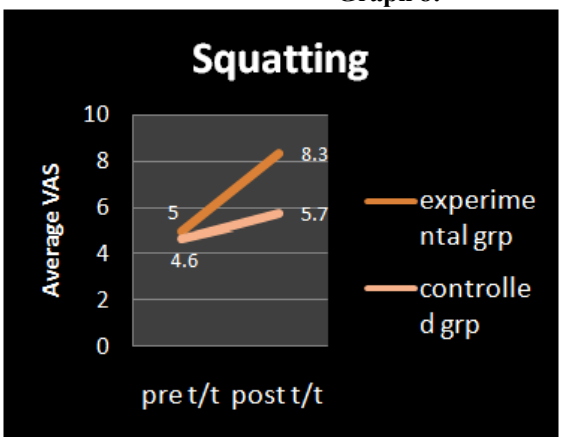
Graph 5: Represents the improvement in the activity (Backward Bending) in both the groups

Graph 7:



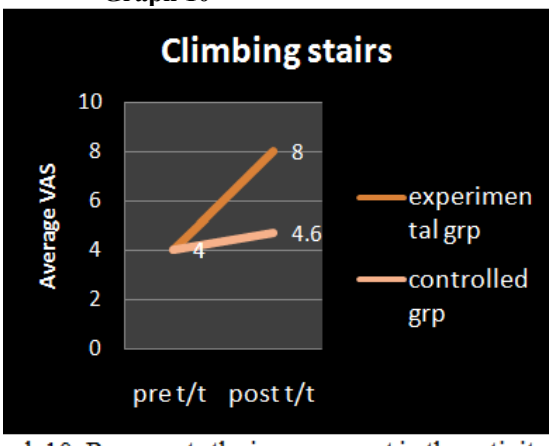
Graph 7: Represents the improvement in the activity (walking) in both the groups

Graph 8:



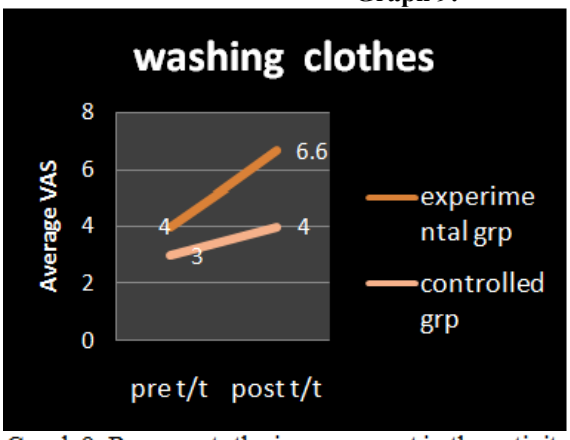
Graph 8: Represents the improvement in the activity (Squatting) in both the groups

Graph 10



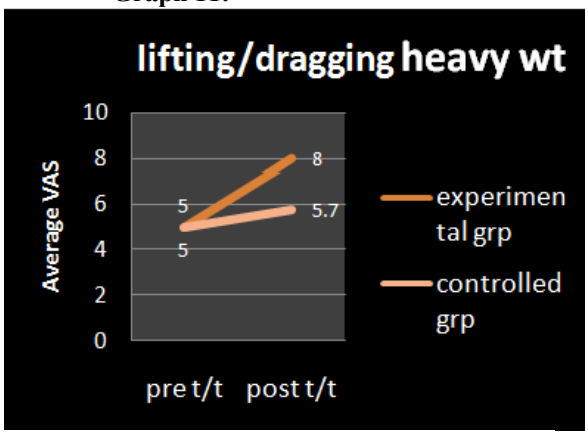
Graph 10: Represents the improvement in the activity (Climbing Stairs) in both the groups

Graph 9:



Graph 9: Represents the improvement in the activity (Washing Clothes) in both the groups

Graph 11:



Graph 11: Represents the improvement in the activity (lifting/dragging heavy weight) in both the groups

IV. Discussion

The Study was conducted in subjects with acute low back pain having myofascial trigger point in quadrates lumborum muscle. 40 Subjects were randomly assigned into experimental and control group where (n=20) respectively in which theexperimental group received S-CS technique along with Moist Heat and control group received Moist Heat only. The statistical analysis using paired t test within the groups showed significant difference ($p<0.005$). But when the mean differences of both the groups were compared the experimental group showed a clinically significant difference of 3.75 with 95 % confidence interval (4.176, 3.024) whereas the control group showed mean difference of 0.825 which is not clinically significant. Improvement in the functional activity was more significant in the experimental group than in the control group. Our findings were consistent with the previous other trials that have showed that S-CS is effective in reducing pain for hip abductors and adductors (Wong et al 2004)[19], in treating patients with acute low back pain[26].

The effectiveness of SC-S technique can be explained by the proprioceptive theory which states that SC-S corrects the aberrant neuromuscular activity mediated by muscle spindles & local circulation or the inflammatory reactions mediated by the sympathetic nervous system. According to the proprioceptive theory, the neuromuscular imbalance, which is created by continuous stimulation of the muscle spindles, can be reduced by passively shortening the dysfunctional agonist muscle. SC-S also allows the normal muscle spindle activity to return. Once agonist muscle spindle activity is reset, antagonist muscle spindle activity can also return to the resting state relieving aberrant neuromuscular activity & restoring normal function[27].

In vitro SC-S model have shown to induce fibroblast proliferation & secretion of proinflamatory & anti-inflamatory interleukins may contribute to the clinical efficacy of SC-C[28].

The result of our study and the supporting explanation about Proprioceptive Systems in results of in vitro strain counterstrain model together lead us to believe that S-CS technique addresses neuro-muscular hyperirritability and muscular hypertonicity as mediated by the proprioceptive system. It also appears to reduce tissue tension, allowing for the resolution of the inflammatory response, which leads to reduction in pain and improving the functional outcome.

V. Conclusion

SCS technique is effective in relieving pain due to Quadratus Lumborum trigger point, thus improving the functional capacity and can be used in physiotherapy management of Low Back Pain. Hence we conclude that S-CS technique can be used for the sub-groups of low back pain.

Limitation

Long term follow up was not carried out.

Conflict Of Interest

There was no conflict of interest within the authors.

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