

## Effect of Reciprocal Inhibition with Ischemic Pressure on the Trigger Point of Quadratus Lumborum Muscle in Low Back Pain

### ABSTRACT

#### Background and Aim

Quadratus lumborum trigger points developed in low back pain. The aim of this study was to compare Reciprocal Inhibition with Ischemic Pressure on the Trigger Point of Quadratus Lumborum muscle in Low Back Pain.

#### Methodology

A 6 month randomized controlled trial was conducted. Non probability Convenience sampling was used to select a sample 50 participants having low back pain with Quadratus lumborum trigger points placed into group 1 and group 2 by lottery method. Group 1 was treated with reciprocal inhibition and ischemic pressure along with conventional therapy and group 2 was treated with ischemic pressure along with conventional therapy. The data collection tools were Numeric pain rating scale and Goniometer. Data was analyzed by statistical package for social science 21. Independent t-test used for between comparison analysis and Paired t-test was used for within analysis.

#### Results

The numeric pain rating scale mean difference in group 1 and group 2 was  $4.72 \pm 0.12$ ,  $5.13 \pm 0.13$  respectively. The Quadratus lumborum muscle length mean difference in group 1 and group 2 was  $8.95 \pm 1.67$ ,  $5.34 \pm 1.25$  respectively.

#### Conclusion

The addition of reciprocal inhibition with ischemic pressure showed significant results.

#### Keywords

Reciprocal Inhibition, Ischemic Pressure, Quadratus Lumborum, Back Pain, Myofascial Trigger Point Pain, Articular Goniometry, Range of Motion

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## INTRODUCTION

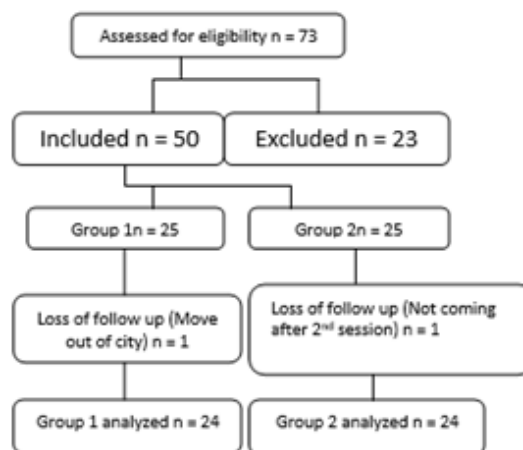
The area of low back pain is between gluteal fold and costal margin<sup>1</sup>. The classification of low back pain according to time period is acute, subacute and chronic and according to cause is specific and non-specific<sup>2</sup>. The risk factors of low back can be age, educational status, psychological issues, job satisfaction, occupational factors and obesity<sup>3</sup>. Low back pain is one of the main cause of disability<sup>4</sup>. The stability of lower back is mainly depends upon the muscles in that region. These are called core stabilizers. Among these muscles quadratus lumborum is responsible for extension, flexion and side bending of lumbar region<sup>5</sup>. Quadratus lumborum is also involved in lower back stability but this muscle is overlooked<sup>6</sup>. Trigger points are tender region in taut band of skeletal muscles. They are multiple foci present in trigger zone<sup>7</sup>. In American population it was found that 44 million people having low back pain also had myofascial trigger point<sup>8</sup>. In another study researcher found that 30 percent patient having low back pain also had myofascial trigger point<sup>9</sup>. 55% musculoskeletal pain is cause by myofascial pathologies. Overuse of muscle cause myofascial trigger points<sup>10</sup>. In lower back instability the stabilizers work beyond their limits. As quadratus lumborum is also a stabilizer of lower back so trigger point can develop in quadratus muscle<sup>11</sup>. There are many Diagnostic criteria for myofascial trigger points. According to Simmons a patient had trigger point if he met five major criteria and one minor criteria. The major criteria in Simmons study were localized spontaneous pain, altered sensation in trigger point area, the involved muscle should contain taut band, localized tenderness and decrease in range of motion. The Minor criteria included spontaneous pain and twitch response on pressure and pain relieved by stretching<sup>12</sup>. Treatment of myofascial trigger point include Medicine interventions, psychotherapy, behavioral therapy, chiropractic and physiotherapy. Dry needling, wet needling<sup>13</sup>. In Physiotherapist there are multiple interventions which are used such as modalities, manual therapy and muscle energy techniques<sup>14</sup>. Post isometric relaxation (PIR) and post facilitation stretch (PFS) are included in muscle energy technique. In PIR technique the hypertonic muscle lengthen to barrier where resistance is encounter. The patient will apply force on therapist hand. When patient relax his muscle Therapist will lengthen the muscle to next resistance. Stretching in this stage is contraindicated. In PFS technique patient will exert maximum force on therapist hand in mind range. Therapist will apply stretch after patient relax. In reciprocal inhibition therapist place the patient affected muscle in mid-range and guided to contract maximally either isotonic or isometric pattern. When patient stop contraction he will be instructed to inhale and exhale at the same time therapist will lengthen the muscle to new barrier<sup>15</sup>. If we add reciprocal inhibition with ischemic pressure there will be increase in range of motion and pain will decrease in myofascial trigger point of quadratus lumborum in low back pain.

## METHODOLOGY

Data was collected from Riphah Rehabilitation department in Pakistan Railway General Hospital Rawalpindi. It was randomized control trial. 50 patients of low back pain having trigger point of Quadratus lumborum were included in the study by Non-probability convenient sample technique and randomly assigned in two groups using lottery method. Statistician was blinding in this study. (Group 1=25 and Group 2=25). Physical therapist assesses the patients having Low back pain with quadratus lumborum involvement, Twitch response in muscle and taut band on palpation were included (using Simmons diagnostic criteria). Patients having acute injury, prolapsed inter vertebral disc and recent surgery were excluded. Data was collected through Numeric pain rating scale (NPRS) for pain and Goniometry for the length of Quadrates lumborum muscle. In NPRS patient was instructed to tick the number in given scale, 10 indicated unbearable pain and 0 indicate no pain<sup>16</sup>. The length of quadrates lumborum muscle length was measured when patients were in standing position and side flexion<sup>5</sup>. A total of 73 patients 23 were excluded. Out of 50 patients 25 patients assigned to each group. One patient from group1 and one patient from group 2 were dropped out. 24 patients in each groups

were present for further study. Measurements were taken before the 1<sup>st</sup> visit and at the end of last session. Each patient was treated for 4 consecutive sessions. Group 1 was treated TENS was applied for 10 min having frequency 100Hz and duty cycle 250 $\mu$ s<sup>17</sup>. Hot pack was applied for 10 min<sup>18</sup>. Ischemic pressure was applied on trigger point in prone lying up to tolerance of patient for 20 to 60 seconds and repeat for 3 to 5 times. (19) For Stretching of quadratus lumborum (QL) patient was placed in position as lying supine, head and legs moved in banana position opposite to affected QL. After 20 seconds of maintaining banana position patient will move back to resting position. The procedure was repeated 5 to 6 times. Reciprocal inhibition for QL was performed in supine position. Patient asked to place his hands behind the neck. Therapist was standing behind the patient, while bending trunk opposite from involved QL therapist hold opposite shoulder for 10 seconds and repeat for 5 times. In Group 2 TENS, hot pack, ischemic pressure and Stretching of quadratus lumborum protocol were applied and their protocol was same as in group 1. Data was analyzed by statistical package for social science 21. Shapiro-wilk test was used to assess normality. As data was normally distributed so Independent t-test used for between comparison analysis and Paired t-test was used for within group analysis.

### Consort Diagram



### Ethical Consideration

The ERC of Riphah international university approved the research and Pakistan Railway General Hospital allow to conduct the study in their setting with ref No RIPHAH/RCRS/REC/00166. The consent was taken from patients.

### RESULTS

The mean age of group 1 was 44.5 $\pm$ 13.5, and group 2 was 42.1 $\pm$ 9.9, the male participant in group 1 were 91.7% and in group 2 were 66.7%, the female participant in group 1 were 8.3% and in group 2 were 33.3%. In group 1 87.5% participant were railway employ, in group 2 66.7% were house wives. (Table I) Quadratus lamborum muscle length and numeric pain rating scale were compared between groups (Table II). Group 1 was treated with reciprocal inhibition in addition to baseline treatment. The pre QLML mean was 10.75 $\pm$ 2.13 the post QLML mean was 19.70 $\pm$ 0.46 and mean difference was 8.95 $\pm$ 1.67. The pre NPRS was 5.91 $\pm$ 0.77 and post NPRS was 1.20 $\pm$ 0.65 and mean difference was 4.71 $\pm$ 0.12. The Group 2 was treated with baseline treatment and the pre QLML mean was 11.41 $\pm$ 2.65 the post QLML mean was 16.75 $\pm$ 1.4 and mean difference was 2.34 $\pm$ 1.25. The pre NPRS was 6.3 $\pm$ 0.81 and post NPRS was 1.29 $\pm$ 0.95 and mean difference was 5.01 $\pm$ 0.14. When between groups analysis was

performed the P value of QLML before treatment was 0.342 and after treatment was 0.00. There was no significant improvement in NPRS ( $p=0.726$ ).

**Table I: Demographic Data of all 48 patients.**

Variables		Group 2	Group1	Overall
Age		42.1±9.9	44.5±13.5	43.4±11.85
Gender	Male	62.5%	33.3%	91.7%
	Female	37.5%	66.7%	8.3%
Occupation	Railway employ	60.4%	33.3%	87.5%
	House wife	37.5%	66.7%	8.3%
	Police man	2.1%		4.1%
Duration of pain	1month	41.7%	29.9%	54.2%
	2 month	27.1%	33.3%	20.8%
	3 month	12.5%	20.8%	4.2%
	4 month	8.3	4.2%	12.5%

**Table II: Changes in Muscle Length and Pain between Group Comparisons.**

	Group	Mean	P Value
QL length(pre)	1	10.75±2.13	0.342
	2	11.41±2.65	
QL length(post)	1	19.70±0.46	0.00
	2	16.75±1.4	
NPRS(pre)	1	5.92±0.77	0.076
	2	6.33±0.82	
NPRS(post)	1	1.2±0.65	0.726
	2	1.2±0.95	

## DISCUSSION

There was significant improvement ( $p<0.05$ ) in NPRS and QLML in both groups. The mean difference for QLML in group 1 was  $8.95\pm1.67$  and in group 2 was  $2.34\pm1.2$ . The mean difference of NPRS in groups 1 was  $4.71\pm0.12$  and in group 2 was  $5.01\pm0.14$ . When both groups were compared the p value of QLML was  $<0.001$  and of NPRS was 0.726. Results showed that when reciprocal inhibition added with ischemic pressure there will be increase in the QLML. G.Yatheendra Kumar et.al in 2015 compare MET with Ischemic pressure for Trp of trapezius muscle. The mean difference of VAS for ischemic compression was 4.4 and for MET was 0.38. The mean difference of ROM for ischemic compression was 11 and for MET was 14.6. In this study we combine reciprocal inhibition with ischemic compression the mean difference for NPRS was 4.72 and for ROM was 8.95. If we compare with previous study the improvement in pain and ROM was almost same<sup>20</sup>. Amit V. Nagrale et al in 2010 compare

MET with integrated with neuromuscular inhibition technique (INIT) the mean difference of VAS in MET group was 0.93 and in INIT group was 1.18. The mean difference of ROM in MET group was 1.6 and in INIT group was 3.73. In our study we combine reciprocal inhibition with ischemic compression the mean difference for NPRS was 4.72 and for ROM was 8.95. the result showed that if we add MET with ischemic pressure there will be more improvement in pain and ROM instead of MET alone used in previous study<sup>21</sup>. Rabia noor et.al in 2016 combine MET with strain-counter strain (SCS) for TrP of trapezius muscles. The mean difference of VAS was 4.5. In this study, the combination of reciprocal inhibition and ischemic compression shows the mean difference for NPRS was 4.72.the result showed that there will be same effects if we add MET with ischemic pressure or SCS<sup>22</sup>. Hugh Gemmell et.al in 2008 conducted a study to compare ischemic pressure (IC) with trigger point release (TrP release) on trapezius muscle. The mean difference of VAS in TrP release group was 1.67 and in IC group was 1.83. The MD of ROM in TrP release group was 5.5 and in IC group was 0.2. The results show that there was no significant difference between ischemic pressures and trigger point release. By comparing with this study results showed that by adding MET with ischemic pressure give better results than ischemic pressure alone<sup>23</sup>. Kostopoulos, D, et.al. Studied the effect of ischemic pressure and passive stretch on trapezius muscle trP. The results showed that ischemic pressure was more significant than passive stretch and when these two techniques were combined there were more significant results for pot treatment reading (2.45) in VAS. Cesar fernandaz et.al in 2005 conduct a systemic review about effect of ischemic pressure (IP) on trigger point along with other techniques like modalities, exercise and stretching. They concluded that combining IP with other techniques give better results. An article in that review showed the post treatment mean of pain was 2.46 when combining IP with Hot pack, TENS and active ROM. In current study IP was combined with hot pack, TENS and stretching. By comparing the mean of post treatment pain score with current study (1.2) there was more improvement in pain as compare to previous studies <sup>24,25</sup>. Rickards, L.D. in 2006 conducted a systemic review of non-invasive treatment effects on myofascial trigger points (mTrP). He concluded that TENS was also effective for mTrP. He also concluded that ischemic pressure and traditional thigh massage are equally significant. Results showed that Ischemic pressure and sustained stretch gives better results than active ROM exercises <sup>26</sup>.

## CONCLUSION

Ischemic pressure had effect on myofascial trigger points. When reciprocal inhibition added with ischemic pressure there will be significant improvement in pain and range of motion for myofascial trigger point in low back pain.

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