

Effect of Stretching on Shortened Quadratus Lumborum Muscle in Non Specific Low Back Pain

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Abstract

Introduction: Low back pain is an extremely common problem that most people experience at some point in their life. Low back pain is well documented to be an extremely common health problem however, its burden is often considered trivial. The common form of low backache is mechanical type and 80-90% patients will complain of dull, achy, diffuse pain and stiffness that is confined to the low back area or may radiate to buttock and hip which results from reflex muscle spasm from primary pain, where there may have trigger points within their muscles [1]. Quadratus lumborum muscle is an important stabilizer of the lumbar spine [2]. The quadratus lumborum, or QL, is a common source of lower back pain [3]. *Purpose of the Study:* To find out the effect of stretching on quadratus lumborum muscle in non specific low back pain. *Methods:* Group A: Group A (15 patients) received core stability warm up and spinal extension exercise. Group B: Group B (15 patients) received the same treatment line with addition of Quadratus Lumborum stretch. *Conclusion:* The study concludes to that there is significant difference on between Group A and Group B on the basis of Oswestry Low Back Pain Disability Questionnaire. Though there is no significant difference between Group A and Group B on the basis of VAS. *Discussion:* The study was an experimental study which aim to find out the effect of stretching on shortened quadratus lumborum muscle in non-specific low back pain the study designed comprised of 30 subject and they were equally divided into 2 group group A consist of 15 subjects and group B consist 15 subjects the showed an significant result on comparing between the group A and group B the result was significant. *Limitations of Study:* The sample size was small consisting of 30 subjects. Other muscle components which have a significant role in causing non-specific low back pain were not taken into consideration. Marginal tightness in muscle such as Iliopsoas, Hamstring and Tensor fascia Latae was not considered. Body mass index was not controllable. *Future Scope of Study:* Larger sample size can be taken. Study can be conducted for longer duration. Different age groups can be taken.

Keywords: Stability Warm Up exercise; Spinal Extension Exercise; Quadratus Lumborum Stretching; Oswestry Low Back Pain Disability Questionnaire and VAS.

Introduction

Low back pain is an extremely common problem that most people experience at some point in their life. Low back pain is well documented to be an extremely common health problem however, its burden is often considered trivial. Low back pain is the leading cause of activity limitation and work absence throughout much of the world, and it causes an enormous economic burden on individuals, families, communities, industry and governments.⁶

The common form of low backache is mechanical type and 80-90% patients will complain of dull, achy, diffuse pain and stiffness that is confined to the low back area or may radiate to buttock and hip which results from reflex muscle spasm from primary pain, where there may have trigger points within their muscles [1].

Low back pain is usually classified as 'specific' or 'non-specific'. Specific low back pain is defined as that caused by a specific pathophysiological mechanism, such as disc prolapse or herniated nucleus pulposus, infection, inflammatory arthropathy, tumour, osteoporosis or fracture.¹ Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (eg, infection, tumors, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equina syndrome) [4].

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The quadratus lumborum, or QL, is a common source of lower back pain [3]. Because the QL connects the pelvis to the spine and is therefore capable of extending the lower back when contracting bilaterally, the two QLs pick up the slack, as it were, when the lower fibers of the erector spinae are weak or inhibited (as they often are in the case of habitual seated computer use and/or the use of a lower back support in a chair) [4].

De Franca and Levine describe the successful resolution of two patients suffering from low back pain, flank pain, buttock and lateral hip pain using myofascial therapy aimed at restoring QL muscle length and function, coupled with spinal manipulative therapy as indicated. The other article by Bryner describes five cases of unilateral flank pain and local tenderness attributed to involvement of the quadratus lumborum muscle [5].

Aim of the Study

To find out the effect of stretching on quadratus lumborum muscle in non specific low back pain.

Statement of Question

Is there any effect of stretching on quadratus lumborum muscle in non specific low back pain.

Hypothesis

Alternative Hypothesis

There will be the significant effect of stretching on quadratus lumborum muscle in non specific low back pain.

Null Hypothesis

There will not be the significant effect of stretching on quadratus lumborum muscle in non specific low back pain.

Review of Literature

Eyal Lederman Et al 2010 [2] in their study the myth of core stability states that Core stability exercises are no better than other forms of exercise in reducing chronic lower back pain. Any therapeutic influence is related to the exercise effects rather than stability issue.

Mathew O.B. Olaogun and Andreas Kopf 2010 [6] in study chronic nonspecific back pain low state that prevalence of LBP is not a dependent on genetic factor that could predispose person of specific ethnicity or race to this disorder men and women are affected equally but lifestyle may be one of the most important predisposing factor for LBP. therefore LBP is starting to become a major health care problem in all countries in which economic and cultural changes are transforming their societies

Margarita Nordin Federico Balague Christine Cedraschi Et Al 2006 [7] In Study Nonspecific Lower-Back Pain Surgical Versus Nonsurgical Treatment state that in acute NSLBP keeping active as tolerated is the most successful choice. with or without help from a healthcare provider sub acute and CNSLBP are described together to stress the importance of a continuum of care and a stepwise approach where the evidence point to combination therapy of exercise.

J. Moffett and S. McLean 2006 [8] in their study The role of physiotherapy in the management of non-specific back pain and neck pain states that The management of more persistent and disabling back pain and neck pain is challenging and may need to focus on helping the patient to come to terms with their pain. The best approach may be intensive biopsychosocial rehabilitation with functional restoration, in which physiotherapists will need to collaborate closely.

Stephen May, Chris Little wood and Annette Bishop 2006 [9] in their study Reliability of procedures used in the physical examination of non-specific low back pain: A systematic review states that This systematic review identified 48 studies that evaluated the reliability of physical examination procedures used in the assessment of the lumbar spine for non-specific low back pain. The methodological quality was only moderate, and conclusions emphasised the findings from high quality studies, defined as $\geq 60\%$ methods score. Many commonly used examination procedures were found either to lack reliability or to have conflicting evidence about their reliability.

Guy Hains, 2002 [10] in study Locating and treating low back pain of myofascial origin by ischemic Compression State that patients reporting low back pain. Chiropractors should carefully assess the lumbar spine, as well as the gluteal, femoral and pelvic regions, attempting to elicit those TPs and TSs that reproduce the patient's chief complaint. Even in cases involving other causes of low back pain (joint dysfunction) the practitioner may augment the patient's recovery by addressing involved soft tissues.

Basal Tawfik Et Al 2001 [11] In Study Symmetry And Linearity Of Trunk Function In Subjects With Non-Specific Low Back Pain state that LBP are both hard to evaluate and diagnose mainly. because of their controversial outcomes since NSLBP subject constitute a high-risk population for further back problem investigation of such patient may lead to understanding of early characteristics of pathological back pain the choice of clerical subject on the one hand and traffic wardens on the other allowed us to work on two population segments with the same.

Methodology

Thirty (30) subjects participated in this study with low back pain and study was done in SGRRIMHS department of physiotherapy at Patel Nagar Dehradun. The duration of study 2 weeks. Random Sampling was done. Subjects were randomly divided into 2 groups. Inclusion criteria, Subject between age group (18-25 year), Subject who expressed a chief complaint tighten of low back ache more than 12 weeks and Subject who had low back pain after maintaining a certain prolonged posture. Subjects were excluded if they had any orthopaedic surgery or any other low back surgery eg. PIVD, Spinal tumour, Tb of spine, Fracture of vertebrae and any lower limb injury. All subjects were given verbal instructions for the procedure and consent form was obtained from each one of them, prior to participation in the study.

Subjects were assessed for non-specific low back pain. All subjects were given verbal instructions for the procedure and consent form was obtained from each one of them, prior to participation in the study. VAS score and ODI score was measured in each & every patients. Instrumentation for data collection includes measuring tape, plinth, marker, mat, Oswestry disability index scale & VAS.

Procedure

A minimum of 30 subjects with mean age of 20.33 ± 1.33 were selected according to selection criteria after ethical committee approval.

Instructions to the Patient

1. Subjects were asked to be regular for the treatment sessions as deemed by the researcher.
2. Subjects were asked to report any discomfort

during the study period and briefed about the use of safety switch

Group A:

Group A (15 patients) received core stability warm up and spinal extension exercise.

Core Stability Warm-Up

It consists of curl up, side-bridge and bird dog exercises.

Curl Up Exercise

Stabilization exercises starts with curl up. In order to perform this exercise the patient lies in crook lying position on the mat and then raises the trunk upwards with hands i.e., stretched up in the air forward or hands behind the back. Advice is given to do this exercise for 10 reps. Each repetition is kept for a 10 seconds hold. In this case of curl-up the hands are placed under the lumbar spine to preserve a neutral spine posture. Do not flatten the back to the floor. Flattening the back flexes the lumbar spine, violates the neutral spine principle, and increases the loads on the disc and ligaments. One knee is flexed but the other leg is straight to lock the pelvis-lumbar spine and minimize the loss of a neutral lumbar posture. Alternate the bent leg midway through the repetitions.

Side Bridge Exercises: The side bridge exercise is performed on the mat by patient lying in side lying position. Lie on your side with elbow underneath your shoulder and your knees either bend to 90 degrees or with your legs straight. Then push the floor away from you with your elbow to lift the shoulder up. Lift your hip off the ground maintaining a straight line from your head to your knees. Hold the position for up to 10 seconds, for 6 reps. then repeat on the other side. The potential issue with this exercise is that knee flexion will tend to pull the pelvis into an anterior tilt due to the attachment of the rectus femoris muscle. To prevent this it is important to incorporate a slight posterior pelvic tilt into the exercise.

Bird Dog Exercise: The patient lying in quadruped prone position on the mat performs bird dog exercise. The patient first lifts one hand in the air. Then it is progressed to two point kneeling. The patient lifts one hand in the air and opposite leg in the air. This is repeated with the opposite leg and the hand. Advice is given to do this exercise for 10 reps. Each repetition is kept for a 10 seconds hold.

Spinal Extension Exercises

Exercise No. 1:

This patient lies in prone lying position on the mat and lifts one leg in the air and then the opposite leg in the air. The patient holds each leg in the air for 5 to 10 seconds. This exercise is done 10 repetitions per set. Initially the patient perform only 2-3 sets and slowly it is increased to 10 sets.

Exercise No. 2:

The patient lies in prone lying position on the mat and lifts both hands in the air and holds it for a period of 5 to 10 seconds hold. This exercise is done for 10 repetitions per set. Initially the patients perform only 1-2 sets and then slowly it is increased to 5 sets.

Exercise No. 3:

This exercise is performed with the patient lying in prone lying position on the mat. The patient first lifts one hand in the air and then the opposite leg in the air. This maneuver is repeated with the opposite arm and the leg. This exercise is done for 10 repetitions per set. Initially the patients perform 2-3 sets only and then slowly it is increased to 10 sets.

Group B:

Group B (15 patients) received the same treatment line with addition of Quadratus lumborum stretch.

Quadratus lumborum stretch in Supine position

1. The patient is supine on the table. The physiotherapist firmly grasps the right foot and ankle and passively stretches the entire leg to pull the hip down, then across the midline, lengthening the QL on the right.
2. From this starting position, the patient attempts to hip hike (pull the hip bone towards the head). Be sure he is not lifting the leg toward the ceiling (hip flexion). Hold this isometric contraction of the QL for 6 seconds as the patient breathes normally.
3. After the isometric push, the stretcher relaxes and inhales deeply. As he relaxes, maintain the leg in the starting position.
4. As he relaxes, passively stretch the leg down and across the midline farther, deepening the right quadratus lumborum stretch.
5. Repeat it 4-5 times.

Data Analyses

Statistics were performed by using SPSS 13. Results were calculated by using 0.05 level of significance.

Using statistical formula for the mean, for a given number of subjects, mean of different variables were calculated by -:

$$\bar{X} = \frac{\sum X}{N}$$

Where,

N = Number of subjects

X = each subjects value

STANDARD DEVIATION (s)

$$s = \sqrt{\frac{\sum x^2}{N}}$$

x = deviation of score from mean

N = Number of subjects

t-test of independent means

The formula for the independent t-test is

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where

\bar{X}_1 is the mean for group 1, \bar{X}_2 is the mean for group 2,

SS_1 is the **sum of squares** for group 1, SS_2 is the **sum of squares** for group 2,

n_1 is the number of subjects in group 1, and n_2 is the number of subjects in group 2.

t-test of dependent means

The formula for the dependent t is:

$$t = \frac{\sum D}{\sqrt{\frac{n \sum D^2}{n-1}}}$$

Where D is the difference between pairs of scores,

$$D = X_2 - X_1$$

df = n - 1 and n is the number pairs of subjects in the study.

Results

Group Description

Total Subjects	30
Group A	15
Group B	15
Level of Significance	95%
P < 0.05	Significant
P > 0.05	Not Significant

The study was an experimental study which aim to find out the effect of stretching on shortened quadratus lumborum muscle in non-specific low back pain the study designed comprised of 30

subject and they were equally divided into 2 groups: (1) group A consist of 15 subjects and (2) group B consist 15 subjects the showed an significant result on comparing between the group A and group B the result was significant.

Table 1 showed that Mean and standard deviation for quadratus lumborum pre-interval for group A is 2.69±0.70 and group B is 2.55±0.61 and post-interval for group A is 4.53±0.58 and group B is 5.06±0.37.

Mean and standard deviation for VAS pre-interval for group A is 5.03±1.67 and group B is 5.26±1.95 and post-interval for group A is 1.75±1.24 and group B is 1.09±0.80 (Table 2).

Table 3 showed that Mean and standard deviation for Oswestry pre interval for group A is 38.20±16.64 and group B is 36.12±9.09 and post interval for group A is 21.67±10.45 and group B is 8.78±4.15

After applying T test comparing mean and standard deviation of pre-QL and post-QL mean difference is 1.83333 and standard deviation .69248 (Graph 1).

Table 1: Mean and SD of QL at Pre, Post and MD (Pre-Post) Interval for the subjects of Group A and Group B

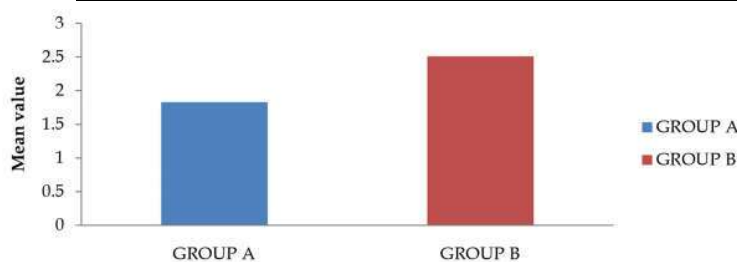
QL	Group A Mean & SD	Group B Mean & SD
Pre-Interval	2.69±0.70	2.55±0.61
Post-Interval	4.53±0.58	5.06±0.37
MD (Pre-Post) Interval	1.83±0.69	2.51±0.42

Table 2: Mean and SD of VAS at Pre, Post and MD (Pre-Post) Interval for the subjects of Group A and Group B

VAS	Group A Mean & SD	Group B Mean & SD
Pre-Interval	5.03±1.67	5.26±1.95
Post-Interval	1.75±1.24	1.09±0.80
MD (Pre-Post) Interval	3.28±0.81	4.17±1.32

Table 3: Mean and SD of Oswestry at Pre, Post and MD (Pre-Post) Interval for the subjects of Group A and Group B

Oswestry	Group A Mean & SD	Group B Mean & SD
Pre- Interval	38.20±16.64	36.12±9.09
Post- Interval	21.67±10.45	8.78±4.15
MD (Pre-Post) Interval	16.53±7.21	27.34±7.47



Graph 1: Comparison of Improvement for QL between Group A and Group B

Graph 2 shows that after applying T test comparing mean and standard deviation of pre-VAS and post VAS mean difference is 3.28000 and standard deviation .81346.

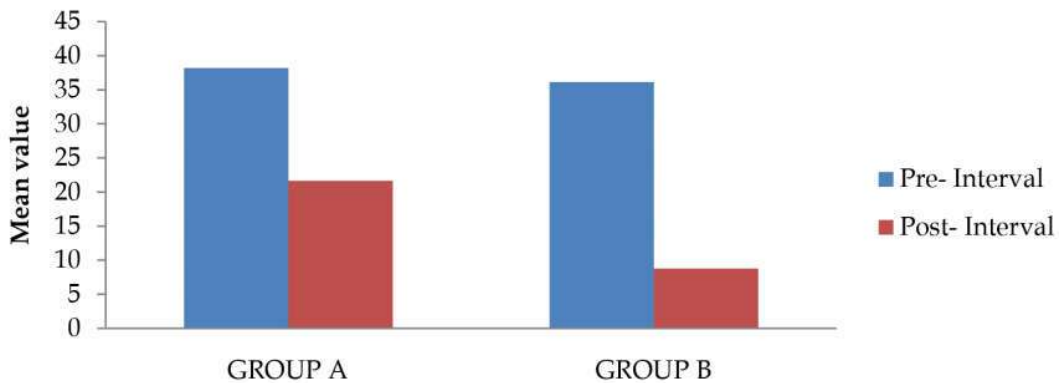
After applying T test comparing mean and standard deviation of pre-Oswetry and post-Oswetry mean difference is 16.53267 and standard deviation 7.20913 (Graph 3).

Discussion

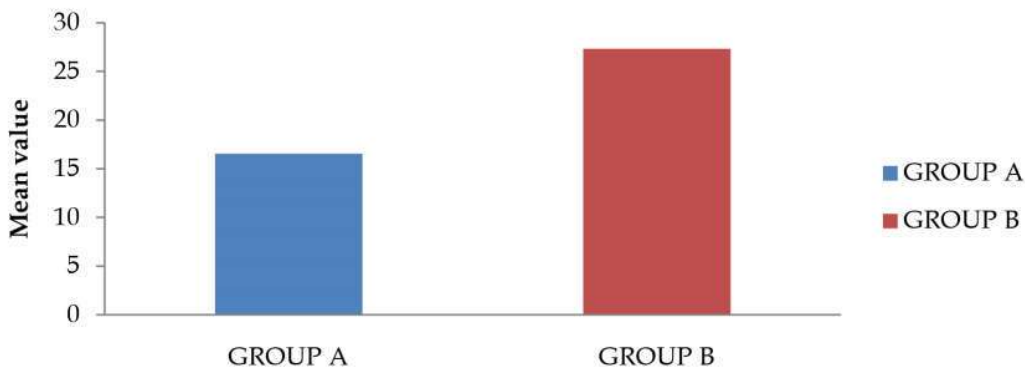
The study was an experimental study which aim to find out the effect of stretching on shortened quadratus lumborum muscle in non-specific low back pain the study designed comprised of 30 subject and they were equally divided into 2 groups: (1) group A consist of 15 subjects and (2) group B consist 15 subjects the showed an significant result on comparing between the group A and group B the result was significant. Mean and standard deviation for quadratus lumborum pre interval for group A is 2.69±0.70 and group B is 2.55±0.61 and post interval for group A is 4.53±0.58 and group B is 5.06±0.37. Mean and standard deviation for VAS pre interval for group A is 5.03±1.67 and group B is 5.26±1.95

and post - interval for group A is 1.75±1.24 and group B is 1.09±0.80. Mean and standard deviation for Oswetry pre interval for group A is 38.20±16.64 and group B is 36.12±9.09 and post - interval for group A is 21.67±10.45 and group B is 8.78±4.15. After applying Ttest comparing mean and standard deviation of pre QL and post - QL mean difference is 1.83333 and standard deviation .69248. After applying Ttest comparing mean and standard deviation of pre VAS and post - VAS mean difference is 3.28000 and standard deviation .81346. After applying Ttest comparing mean and standard deviation of pre Oswetry and post - Oswetry mean difference is 16.53267 and standard deviation 7.20913. Another study stated that The action of the QL is to extend and laterally flex the spine [2,7,10], and with the spine stable, to raise the pelvic crest [2, 10]. The QL has also been shown to be important for stabilizing the spine under load [12]. Travell & Simons write that the QL, “is one of the most commonly overlooked muscular sources of low back pain and provide an extensive review of the QL muscle [13].

Another study stated that Karen P. Barr The quadratus lumborum is an important lateral stabilizer of the spine.8It is attached to the



Graph 2: Comparison of mean value for Oswestry at Pre and Post Interval within Group A and Group B



Graph 3: Comparison of Improvement for Oswestry between Group A and Group B

transverse processes of the lumbar spine through the thoracolumbar fascia and therefore increases lumbar stiffness. It is a key muscle targeted in physical therapy for lumbar stabilization [14]. Another study stated that Stuart M. McGill The side bridge exercise has been documented to challenge the quadratus lumborum and the muscles of the abdominal wall to enhance spine stability [14]. Another study stated that Stuart McGill True spine stability is achieved with a “balanced” stiffening from the entire musculature including the rectus abdominis and the abdominal wall, quadratus lumborum, latissimusdorsi and the back extensors of longissimus, iliocostalis and multifidus [15]. Another study stated that Sonja kneppers the role of the quadratus lumborum as related to stability demands is associated with its increased activity during periods of lumbar sagittal moments and compression. Another study stated that R.S. Jemmetquadratus lumborum, psoas and transverseabdominis have been described as functioning to maintain spinal stability [10].

Limitations of Study

The sample size was small consisting of 30 subjects.

Other muscle components which have a significant role in causing non-specific low back pain were not taken into consideration.

Marginal tightness in muscle such as Iliopsoas, Hamstring and Tensor fascia Latae was not considered.

Body mass index was not controllable.

Future Scope of Study

Larger sample size can be taken.

Study can be conducted for longer duration.

Different age groups can be taken.

Conclusion

The study concludes to that there is significant difference on between Group A and GroupB on the basis of Oswestry Low Back Pain Disability Questionnaire. Though there is no significant difference between Group A and Group B on the basis of VAS.

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