Innovations

To Compare the Effectiveness of Myofascial Release and Stretching in Treatment of Non-Specific Low Back Pain: A Randomized Control Trial

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Abstract:
Background*: Non-specific low back pain (NSLBP) prevalence is considerably high in younger individuals due to postural muscle tightness and weakness of core stability muscles. Early diagnosis of the sources of NSLBP may help to prevent it from being transformed into Chronic NSLBP. This study aimed to analyze and then compare the effectiveness of two manual treatments in two separate groups i.e., myofascial release technique (MFR) and Stretching exercise on persons with non-specific low back pain.* ***Materials and Methods****: 42 healthy individuals having NSLBP with age group of 18 to 35 years having tightness of Quadratus lumborum (QL) and Piriformis muscle were recruited. They were randomly assigned into 2 groups. Group A received MFR technique with core strengthening exercise (CSE) and Group B received Stretching exercise with CSE, for 6 weeks, 3 days/week. Numeric pain rating scale (NPRS), Oswestry disability index (ODI) and core strength was measured before and after the 6 weeks.* ***Results****: It showed significant reduction in NPRS (p=0.001), improved the ODI (p=0.001) and core strength (p=0.001) in both the groups. The inter group comparison showed MFR gave better result than stretching in improving core strength (p=0.014) but both the interventions were equally effective in increasing the ODI and reducing the pain (p>0.001), 6 weeks after the treatment.* ***Conclusion****: MFR and Stretching both are equally effective in reducing pain and improving ODI. However, MFR is more effective than stretching in improving core strength for individuals with non-specific low back pain.*
Key Words: Low back pains, Myofascial release, Muscle stretching exercise, Piriformis muscle

Introduction

Low back pain (LBP) affects 84 percent of people in industrialized countries at some point in their lives. About 85% of back pain is classed as non-specific, meaning that no anatomical changes, inflammation, or specific disease can be identified as the cause.[1]

Low back discomfort has a significant impact on a person's physical, social, psychological, and economic spheres of existence. Only if its origin is understood can low back pain be called specific; it can involve soreness in any part of the spine from the 12th rib to the inferior gluteal fold.[2,3]

When non-specific low back pain persists for more than six weeks, it is considered chronic. Chronic non-specific low back pain (CNSLBP) is the second most common reason for a doctor's visit, the second most common cause of disability, and the most prevalent reason for physical activity (PA) limitations in those under 45 years old.[4,7] The overall mean prevalence of (CNSLBP) is substantially higher in female subjects.[8]

Changes in postural control, or the ability to stabilize the trunk, are the main cause of NSLBP. Postural control in NSLBP is impaired on a neuromuscular level, according to altered activity patterns of abdominal and extensor muscles of the back.[1,5,6]

The core muscles are the primary muscles group for maintain the stability of the spinal column. According to their roles and characteristics, the two groups of cores muscles. The first set of muscles consists of the deep core muscles, often known as local stabilizing muscles. In particular, the transversus abdominis, lumbar multifidus, internal oblique muscle, and quadratus lumborum make up this group of muscles.[25]

The QL muscle originates from the iliac crest (inner lips) and the iliolumbar ligament, and it attaches to the transverse processes of the lumbar bodies of L1–L4 and the internal surface of the 12th rib.[10,11] Lower back pain is frequently caused by quadratus lumborum. Because it connects the pelvis to the spine, unilateral contraction causes extension and side bending to the same side as bilateral contraction. Quadratus lumborum tightness can cause pain in the lower ribs as well as the iliac crest if the lateral fibers are impacted. Pain in the sacroiliac joint and buttock can be caused by a tightening of the medial fibers.[12,13,14]

The flat, pear-shaped piriformis muscle is situated in the gluteal area of the hip and proximal thigh. Deep to the gluteus maximus, it runs parallel to the posterior edge of the gluteus medius.[15] Piriformis muscle tightness is frequently confused with piriformis syndrome, which is described as sciatic nerve neuritis produced by an injured or inflamed piriformis muscle. Tightness, on the other hand, is merely the shortening of the muscle's length owing to a sedentary lifestyle.[16,17]

Myofascial release (MFR) is a type of manual medicine that entails applying a low-load, long-duration stretch to the Myofascial complex with the goal of restoring optimal fascial length, reducing pain, and improving functionality.[9,20] There are two main MFR techniques in use: direct and indirect release. Direct release uses the Therapist's knuckles, elbows, or tools to apply sustained few- kilogram pressure (90-120 seconds) on restricted tissue barriers. As a result, the indirect release approach stretches the myofascial complex for a longer period.[21]

Stretching mainly focuses on improving the length of a musculotendinous unit, by increasing the distance between a muscle’s origin and insertion.[18,19,23] Static stretching involves movements in a controlled manner to the end range of motion of one or more joints either by actively contracting the agonist muscle or by some other external forces like gravity, or partner stretching aids.[18,22]

The primary responsibility of the therapist is to appropriately screen the individual and treat the CNSLBP with various therapeutic methods. Due to over activities of Quadratus lumborum and Piriformis muscles are more prone for tightness. There are several studies compared individual treatment options for the treatment of Quadratus lumborum and Piriformis tightness. Core strengthening exercise is another important treatment of choice for the treatment of NSLBP. To the best of our knowledge, there is less randomized controlled study investigating the effects of myofascial release technique and stretching along with core strengthening exercise. Therefore, the aim of the current study is to decrease tightness of Quadratus lumborum and Piriformis with myofascial release technique and stretching and strengthen the core muscles by core strengthening exercises and investigate all the possible effects.

2. Materials and methods-

2.1 Ethical clearance and consent

Ethical approval for the study was obtained from the Institutional Ethical Committee Review Board of Alva's College of Physiotherapy, Moodbidri, with reference number ACP/OP/2021/OL 03. A prior written consent was taken from all the participants to participate in the study.

2.2Study design and sample size-

The study was conducted at Alva's College of Physiotherapy, Moodbidri, Dakshina Kannada, Karnataka, India. The sample size was calculated by using G*power 3 program with a power of80%, effect size of 0.8, error probability of 0.05.Lottery method was used for random allocation.

2.3 Selection criteria

The selection criteria of the study were 1) 18-35 years 2) female adults 3) pain more than 3 on NPRS scale 4) LBP at least more than 3 months 5) tightness of QL and piriformis. The exclusion criteria included 1) patients with neurological symptoms and radiating pain 2) any disc pathologies such as spondylolisthesis, herniation etc. 3) systemic diseases 4) previous spinal and hip surgeries 5) inflammatory conditions.

2.4 Procedure

Individuals who fulfilled the inclusion criteria were interviewed for their consent to participate in this study and written consent was obtained from individuals. The study purpose and protocol were explained to all the participants. Their age, height was recorded for demographic statistics and baseline outcome measure were assessed. Subjects were assessed to find out the Quadratus lumborum and piriformis muscle tightness. For Quadratus lumborum muscle tightness, subjects were in standing side bending to both the side. Stretching pain indicates tightness of QL muscle. Tightness of Piriformis muscle is assessed in supine position with tested side hip and knee flexed to 90 degrees and then using Flexion, Adduction, and Internal Rotation test (FAIR TEST). After the physical assessment, the subjects were randomly divided into one of two treatment groups. The exercise for first group (Group A) consists of MFR with core stability exercise. The exercise for second group (Group B) consists of Stretching exercise with core stability exercise. Subjects in both groups were received the treatment for 3 days per week for 6 weeks.

Application of Myofascial release for Quadratus lumborum:

The participants on side lying on the unaffected side with both hip and knees flexion. Two towels rolled were placed under the participant's neck and waist to allow more space between the 10th rib and iliac crest for palpating the Quadratus lumborum (QL). To release this muscle, the therapist placed thumbs on the QL perpendicularly to the participants spine as shown in figure-1. The therapist applied a vertical hold force for 5 seconds and then release it. It will be repeated for 5-6 times. Total duration of the treatment is 2 minutes.

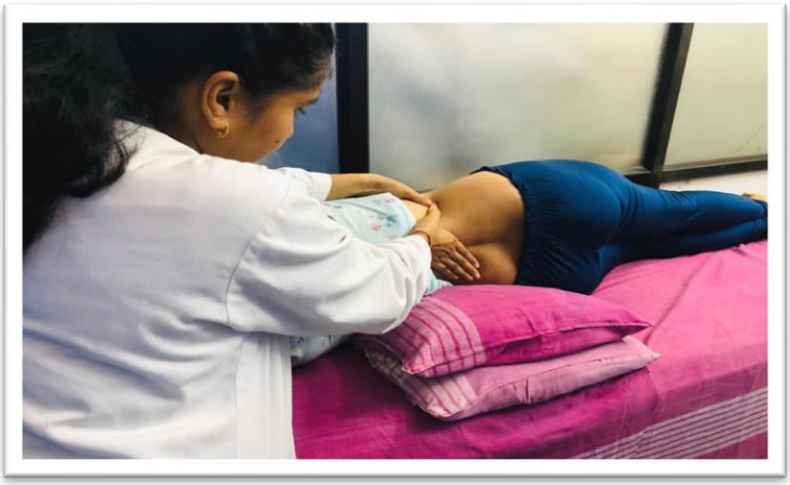

Figure-1: Application of myofascial release for quadratus lumborum muscle

Figure-2: Application of myofascial release for piriformis muscle

Figure-3: Application of stretching for Quadratus lumborum

Figure-4: Application of stretching for Piriformis

Application of Myofascial release for Piriformis:
The participants on prone lying. The Piriformis muscle was located by an imaginary line drawn between the midpoint of the lateral aspect of the sacrum and the greater trochanter. A contact was established in the gluteal area about 3cms from the sacrum. With knuckles, a gradual pressure will be applied in an anterior direction as shown in figure-2. When the first layer of resistance was engaged, a constant pressure was maintained until that layer softened and the fibers of piriformis were contacted (approximately 90 s). A line of tension was taken along the muscle, in the direction of the greater trochanter. Possibilities of muscle guarding were monitored and the depth of contact adjusted accordingly. Total duration is 3 minute

Application of stretching for Quadratus lumborum:
The patient in supine position on the table. The therapist firmly grasps the foot and ankle passively stretches the entire leg to pull the hip down, then across the midline, lengthening the QL on the side. From this starting position, the patient attempts to hike the hip. Be sure she is not lifting the leg towards the ceiling as described in figure-3. Hold this isometric contraction of the QL for 6 seconds as the patients breathes normally. After the isometric push, the stretches relaxes and inhales deeply. As she relaxes, maintain the leg in the starting position. As she relaxes, passively stretch the leg down and across the midline. Repeat it 4-5 times.

Application of stretching for Piriformis:
Patient on supine position, on the affected side of the leg. Flexion of the hip at 90 degrees, adduction of the hip, external rotation of the hip as shown in figure-4. Stretch was sustained for 30 seconds and repeated 3 times in a session.

Application of Core stability exercises:

Curl up exercise:
Subjects in supine position to crook lying position. From crook lying position the subject will lift the head and neck and by using both the hands try to touch the knees. Repeat this exercise for 5-7 times.

Side bridging exercise:
Subjects in side lying position with bent elbow support both the knees will be flexed/ extended. By the help of the bent elbow subject will lift her pelvis hold it for 5 secs and then comes down. Repeat it for 5-7 times.

Bird-dog exercise:
Subjects will be in quadruped position. Then extend the one hand and opposite side leg hold the position for 5-7 secs. Repeat the exercise for 5-7 times.

2.5 Statically analysis

The data analysis was done using SPSS 23 for windows. Descriptive statistics were calculated for each group. The paired t test was used to test the significance within group for NPRS, ODI and core strength for both the groups. Unpaired t test was used to test the significance of NPRS, ODI and core strength between the groups.

Results
The baseline data were homogeneous with respect to gender, age, height, weight, and BMI between all two groups that is $p>0.05$ as reported in table 1. A total of 42 female adults included in the study and were divided into two groups by simple random sampling. The mean age of the participants in group A was 22.81±2.272 and group B was 21.81± 1.504. The mean weight and height of group A participants were 52.67±4.70, 161.50±4.01 and group B were 53.17±3.49, 161.25±3.92 respectively.

Table 1: Demographic distribution

Group	Age	Weight	Height	BMI
Group A	22.81±2.272	52.67±4.70	161.50±4.01	22.95±95
Group B	21.81± 1.504	53.17±3.49	161.25±3.92	23.70±3.13
P- value	0.728	0.770	0.870	0.668

The results showed that there was significant difference between pre and post scores in outcome parameters within the two groups calculated by paired t test ($p<0.05$) as reported in table 2. Unpaired t test was used to calculate pre and post-test significance between the two groups and it showed that there is significant difference between the groups in improving core strength ($p<0.05$), but there is no significant difference between the groups for NPRS and ODI score ($p>0.05$), which is described in table 2.

Table 2: Comparison within and between the groups

Outcome measure		Intra group comparison		Inter group comparison
		Group A	Group B	
NPRS	Pre-test	5.619 ± 1.071	5.905 ± 0.995	0.686
	Post-test	2.762 ± 1.091	2.905 ± 1.179	
	P-value	0.001	0.001	
ODI	Pre-test	32.00 ± 6.419	34.143 ± 6.514	0.099
	Post-test	22.190 ± 4.976	25.190 ± 6.431	
	P-value	0.001	0.001	
Core strength	Pre-test	15.952 ± 2.819	13.857 ± 2.393	0.014
	Post-test	23.857 ± 2.816	21.571 ± 2.959	
	P-value	0.001	0.001	

Discussion

To the best of our knowledge, this was the first trial that analyzed the effect and compared the potency of two different manual techniques i.e., MFR and Stretching along with core stability exercise on QL and Piriformis muscles.

In literature it showed that the prevalence of the NSLBP among students were quite high. Male and female prevalence rates were 45.3% and 50%, respectively. It also suggested that mean age group was 20.74 (1.59 years) in which 70.9% female students were there.[7,12]

The results of this study showed that the application of MFR and Stretching exercise increased the Core muscle strength, and decreased NPRS in both groups, who had tightness of QL and Piriformis. However, MFR gave better result than stretching in improving core strength but both the interventions were equally effective in reducing pain 6 weeks after the treatment for individuals with non-specific low back pain.

The mechanism behind it is in MFR technique gentle forces are applied to the facial restrictions that in turn elicit vasomotor response and hence increase blood flow to the affected area, thereby enhancing lymphatic drainage of toxic metabolic wastes. It resets the soft tissue proprioceptive sensory mechanism. This latter factor reprograms the central nervous system, enabling a normal functional range of motion and increases the flexibility without eliciting pain.[9,20] MFR can be an effective adjuvant therapy, and it can enhance the effects of physical therapy alone and exercise therapy alone.[18,21]

Stretching helps in relaxing the tissues around the muscles and expansion of the capillaries, resulting in increased blood circulation to the muscle tissues which in turn reduces the pain.[18] In addition to hamstring, iliopsoas, and back muscle stretches as well as abdominal muscle strengthening exercises, study found that Gastrocnemius manual stretching exercise is more useful in lowering pain and enhancing functioning for individuals with persistent low back pain.[19,23] Static stretching of the tensor fascia latae with a load is more efficient than static stretching alone in treating low back pain.[22]

Exercises that are both stretching and strengthening are equally effective in relieving low back pain.[23] It has been found from a study that Core stabilization exercises improves the ability of the segmental muscles which helps in reducing pain in persons with NSLBP.[24] It has been found from a study that Core stabilization exercises improves the ability of the segmental muscles which helps in reducing pain in persons with NSLBP.[25,26]

Recommendations

I. It can be further studied on a larger population.
II. Study can be specified on a particular population showing significant prevalence of Muscle tightness.
III. Specific scales can be used to quantify muscle tightness and core strength of muscles.
IV. More studies can be done by using both the gender.

Conclusion

The present study concluded that both myofascial release and stretching exercise could be used as effective manual therapy for the management of nonspecific low back pain patients with tightness of QL and Piriformis. However, MFR was proved to be a better intervention than stretching for improving core muscle strength, but both techniques had equally effective in reducing pain. Hence the study suggested that incorporation of MFR along with core stability exercise maybe considered when planning a rehabilitation program for patients with NSLBP.

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Conflicts of interest

There are no conflicts of interest

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