Comparative Study on Core Strengthening Exercises and Myofascial Release Technique for Chronic Low Back Pain

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ABSTRACT

Introduction and Aim: To find the efficacy of the concept of core stabilization exercises when compared to myofascial release technique in patients with chronic low back pain. Back pain is a common complaint about people of all ages. The core stabilization is a major trend in rehabilitation; it aims at improving stability strength. Myofascial release technique shows a significant reduction in pain intensity.

Materials and Methods: 60 subjects will be taken by a simple random sampling method with experimental study for 6 weeks using core strengthening exercises and myofascial release technique. The measurements are taken using the Roland–Morris disability questionnaire and The Visual Analogue Scale (VAS).

Result: There is a significant increase in lumbar range of motion and reduce pain in both core strengthening exercise and myofascial release technique than the other two groups.

Conclusion: The present study concluded that core strengthening exercises and myofascial release technique yielded a significant reduction of pain and improvement in functional abilities in subjects with chronic low back pain.

Key Words: Myofascial Release, Chronic low back pain, Visual analog scale, Roland Morris Disability Questionnaire, Core strengthening exercises.

INTRODUCTION

Low back pain is a major disorder that involves the muscles, nerves, and bones of the back. Low back pain may be classified as acute, subacute or chronic (13). The condition may be further classified as mechanical, non-mechanical or referred pain (15). One of the commonest reported risk factors for LBP is sitting longer than 8 hours and biking for more than 3 times per week (28). Individuals with LBP usually report decreased energy, muscular discomfort, mobility limitations, lifting groceries, climbing stairs, and stooping or bending down (26). Low back pain is a leading cause that decreases cardiovascular fitness, muscular strength, flexibility, bone density, and nutrition. Weak abdominal muscles are correlated to the high prevalence of back pain. The upper and lower back is composed of individual segments of the spinal cord if it is not in the proper position it causes undue strain on ligaments, tendons, and muscles (22). Decreased muscle flexibility, trunk strength, and poor muscle endurance have been associated with back pain issues (11,12). In the acute stage, the low back pain is treated with a muscle relaxant physiotherapy is a better option for pain relief. Aim particularly at pain relief initially and then at improving spinal mobility and muscle power and endurance (17).

Prevalence of low back pain in India, age group more than 35 years have more risk than the age group less than 35 years (27). Low back pain was found to be more common among the females i.e. 17% than in male which is around 11% (15). Low back pain complaints were higher in a rural area which is 7.5% than the urban population i.e. 5.5% (8). 57% of individuals suffering from low back pain were found in blue collar jobs (25). Information technology professionals in Tamilnadu are around 51% (9).

Low back pain can be treated by various techniques some of the unique techniques are core stabilization technique and myofascial release technique which has a marked impact on low back pain. Prevention of chronic back pain can be done by learning and practicing good posture, increasing the strength and endurance of the muscles supporting the spine. Exercises produce a neutral effect, especially core stabilization exercises has an impact effect on chronic low back pain. Core serves as a muscular corset that works as a unit to stabilize the body and spine (1). Through the core stabilization exercises, cardiovascular training can be enhanced. The pumping of the blood to the body is facilitated by the cardiac muscles (22). There will need of increased demand for oxygen (24). Core stabilization exercise enhances the flexibility of patients with low back pain (13). It aims to loosen the muscle tightness and brings back the patient to a neutral position. During core strengthening exercises, each muscle fibre extends to the full length of the muscle. Flexibility has a greater effect on the range of motion and decreases the risk of musculoskeletal injuries (22). Strength training has an effect on health indices such as cardiovascular fitness, body composition, bone and mineral density, blood lipid and mental health (2). It also focuses on the abdominal and erector spinal muscles which in turn have an effect on biomechanical functions and stability of the spine and pelvis. The goal of the core strengthening program is to correct the imbalances and muscle weakness with strengthening exercises (22).

Another method used for relieving low back pain is myofascial release technique. Myofascial release technique is effective in reducing pain and improving ADL activities (7). By using myofascial release technique, pain-related disability, depression level can be reduced, and quality of sleep can be enhanced. Myofascial release therapy loosens up restricted movements of the spine leading to the reduction of pain in the low back region (19). It also promotes changes in psychological factors in individuals with pain. The mechanism is when a therapist touches the patient, it may help the nervous system, and reduces the restriction in the durameter which covers the brain. MFR procedures claim to encourage the circulation of fluid in and around the tissues to enhance venous and lymphatic systems and aid in decongesting areas of fluid stasis. This allows for better circulation and perfusion. It allows freedom of movements called unwinding. The fascial restriction release with the correction of dysfunction in the fascia at the intestinal level facilitates sleep and aids in the secretion of serotonin (4). During the treatment technique, heat is produced from the body tissues, and there is a sensation of movement, filling up space and often a therapeutic pulse. According to this theory, fascia responds to the mechanical intervention of therapy in three ways. 1) The ground substance changes its volume and consistency. 2) Cross-linkages between fibres are broken. 3) Inter fibre distance is increased (23). Myofascial release technique improves pain and quality of life in patients with fibromyalgia (5,19). The range of motion can be improved and there will be marked a reduction in pain (10).

The main aim of this study is to find the efficacy of the concept of core stabilization exercises when compared to myofascial release technique in patients with chronic low back pain. The null hypothesis is that there is no significant effect while performing core stabilization exercises and myofascial release technique on low back pain and alternate hypothesis states that there is some significant effect while performing core stabilization exercises and myofascial release technique on low back pain.

MATERIALS AND METHODS

A total of 60 subjects with low back pain in both sexes was taken by simple random sampling method for experimental study at A.C.S medical college and hospital for 6 weeks using core strengthening exercises and myofascial release technique with an inclusion criteria of both sexes with chronic low back pain of age group above 18 to 55 years, occupational dysfunction, complain of pain over lumbar region and excluded for Malignancy over the spine region, Nerve root involvement, Cauda equine syndrome, Recent Spinal surgery, Pregnancy. The measurements

are taken using the Roland–Morris disability questionnaire and The Visual Analogue Scale (VAS).

Intervention:

Group-A: Subjects with chronic low back pain will be given core stabilization exercises for 2 repetitions a day for 6 weeks.

Group-B: Subjects with chronic low back pain will be given a myofascial release technique for 3 times a week for 6 weeks.

Group-C: Subjects with chronic low back pain will be given both core stabilization exercises and myofascial release technique for 6 weeks.

Core Stabilization Exercises (Group-A)

Crunches: a) Lie on your back with your knees bent and your feet flat on the floor.b) "Crunch" or curl your stomach to lift your shoulders just off the floor.

The Plank: a) Assume a front-support position resting on your forearms with your shoulders directly over your elbows. b) Straighten your legs out behind you and lift up your hips to form a dead-straight line from your shoulders to your ankles. You should be balanced on your forearms and toes, with your lower abdomen and back working to keep your body straight. Hold for 1 minute.

Static Leg and Back: a) Lie on your back with your knees bent and your feet flat on the floor. b) Lift your pelvis so that you form a bridge position with a straight line running from your shoulders to your knees. c) Lift your right leg off the floor and extend it.d) Hold for 30 seconds then repeat on the other leg.

Superman: a) Balance on the floor on your hands and knees. Your back should be flat and hips parallel to the floor. b) Raise your right arm out in front of you and raise your left leg out behind you, keeping it straight. c) Hold for 30 seconds and then repeat on the other side.

Hamstring raises a) Balance on the floor on your hands and knees. Your back should be flat and your hips parallel to the floor. b) Raise one leg behind you until you cannot lift it any higher without rotating your hips or arching your back. c) Return the leg to the floor and repeat.

Myofascial Release Technique (Group-B)

Myofascial Release is a safe and very effective hands-on technique that involves applying gentle sustained pressure into the myofascial connective tissue restrictions to eliminate pain and restore motion. The lumbar region is been mostly strained in most of the patients. By targeting specific areas of the fascial system, myofascial therapy can help prepare patients for more aggressive forms of strengthening, or provide pain relief for patients with restricted flexibility and movement, thus allowing patients to return to normal movement and greater function.

The patient is made to lie on the prone lying position. The patient's lower back region should be exposed. And the other parts are been wrapped. Mostly the lumbar region is been strained due to mechanical low backache. The therapist's hand delivers all the intervention. Prior to treatment commencement, the therapist should be sure that the pain patterns they are treating lend themselves to myofascial therapy. If the patient presents with swelling, discoloration or neurological signs and symptoms, it is always advisable to refer to another health/medical care provider regarding further examination and/or investigation. The treatment session lasts at least 30 to 50 minutes or more. It is been conducted for every alternate day for 6 weeks. Trained therapists provide hands-on treatment in a relaxing, private therapy room. The specific releases to different parts of the body vary but generally include the gentle application of pressure or sustained low load stretch to the affected area. The therapist uses the elbow or various tools are been used in the lower back region. The use of the therapist's finger should be avoided to larger areas in order to save the practitioners hand.

A successful treatment protocol relies on identifying trigger points, resolving them and if all trigger points have been deactivated, elongating the structures affected along with their natural range of motion and length. In the case of muscles, which is where most treatment occurs, this involves stretching the muscle. If trigger points are pressed too short a time, they may activate or remain active; if pressed too long or hard, they may be irritated or the muscle may be bruised, resulting in pain in the area treated. The result of myofascial release technique depends on the skills of the therapist.

Core Stabilization Exercises and Myofascial Release Technique (Group-C)

Both core strengthening exercises and myofascial release technique are applied in this group. Out of the three groups, the best results are been obtained after 6 weeks.

Data Collection and Analysis:

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. One Way ANOVA includes of following tests (Test of Homogeneity of Variance, ANOVA, Robust Equality of Means, Post Hoc test Tukey HSD) (multiple comparisons) was adopted to find a statistical difference between three groups.

Table 1: Comparison of Pre VAS score using One ANOVA multiple comparisons Post Hoc Tukey HSD Test between Group A, Group B, and Group C

MULTIPLE COMPARISON	GROUP	MEAN DIFFERENCE	STANDARD ERROR	SIGNIFICANCE
GROUP A	GROUP B	-.400	.321	.433*
	GROUP C	-.467	.321	.323*
GROUP B	GROUP A	.400	.321	.433*
	GROUP C	-.067	.321	.976*
GROUP C	GROUP A	.467	.321	.323*
	GROUP B	.067	.321	.976*

Table 2: Comparison of POST VAS score using One ANOVA multiple comparisons Post Hoc Tukey HSD Test between Group A, Group B, and Group C

MULTIPLE COMPARISON	GROUP	MEAN DIFFERENCE	STANDARD ERROR	SIGNIFICANCE
GROUP A	GROUP B	.000	.333	1.000*
	GROUP C	.933*	.333	.020**
GROUP B	GROUP A	.000	.333	1.000*
	GROUP C	.933*	.333	.020**
GROUP C	GROUP A	-.933*	.333	.020**
	GROUP B	-.933*	.333	.020**

Table 3: Comparison of Pre & Post VAS score using Test of Homogeneity of Variance & One Anova Test between Group A , Group B, and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F Value	Significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	5.60	.828	5.86	.833	5.93	1.03	2	42	.572	.569*
POST	4.13	.845	4.00	.925	3.06	.961	2	42	5.50	.008**

Table 4: Comparison of Pre MORRIS score using One ANOVA multiple comparisons Post Hoc Tukey HSD Test between Group A, Group B, and Group C

MULTIPLE GROUP COMPARISON		MEAN DIFFERENCE	STANDARD ERROR	SIGNIFICANCE
GROUP A	GROUP B	-1.46667	3.42645	.904*
	GROUP C	-4.26667	3.42645	.434*
GROUP B	GROUP A	1.46667	3.42645	.904*
	GROUP C	-2.80000	3.42645	.695*
GROUP C	GROUP A	4.26667	3.42645	.434*
	GROUP B	2.80000	3.42645	.695*

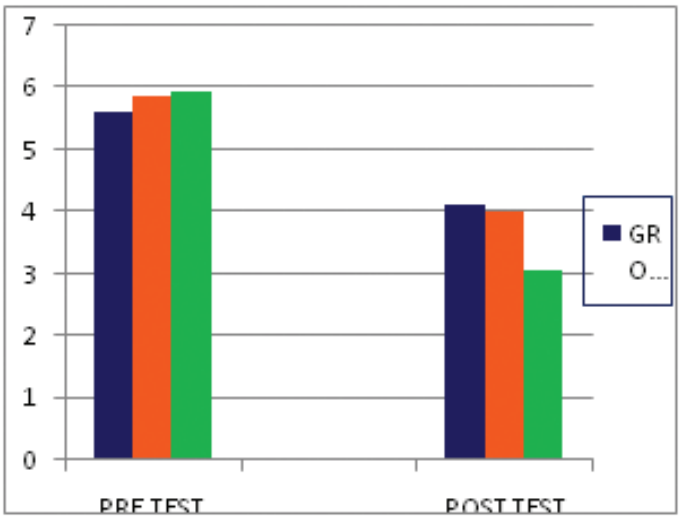
Table 5: Comparison of POST MORRIS score using One ANOVA multiple comparisons Post Hoc Tukey HSD Test between Group A, Group B, and Group C

MULTIPLE GROUP COMPARISON		MEAN DIFFERENCE	STANDARD ERROR	SIGNIFICANCE
GROUP A	GROUP B	1.86667	3.22333	.832*
	GROUP C	9.80000*	3.22333	.011**
GROUP B	GROUP A	-1.86667	3.22333	.832*
	GROUP C	7.93333*	3.22333	.046**
GROUP C	GROUP A	-9.80000*	3.22333	.011**
	GROUP B	-7.93333*	3.22333	.046**

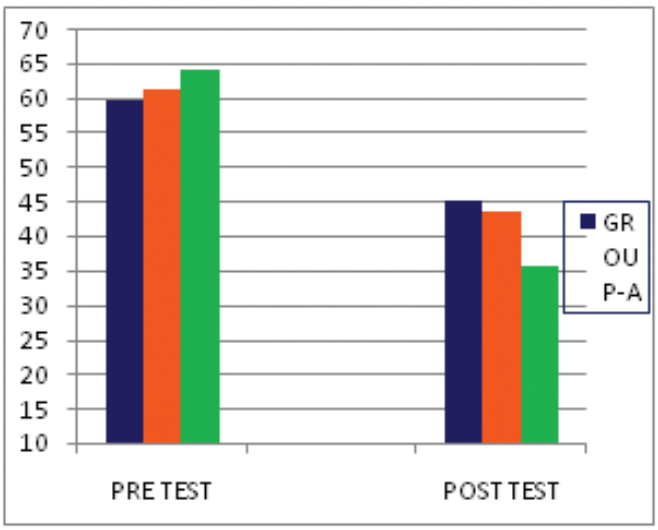
Table 6: Comparison of Pre & Post MORRIS score using Test of Homogeneity of Variance & One Anova Test between Group A , Group B, and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F Value	Significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	59.8	9.35	61.2	9.81	64.06	8.95	2	42	.572	.456*
POST	45.3	9.93	43.4	8.11	35.5	8.32	2	42	5.21	.010**

Graph-I: Comparison of Pre & Post VAS score between Group A, Group B, and Group C



Graph-II: Comparison of Pre & Post MORRIS score between Group A, Group B, and Group C



RESULTS

The pre-test value of mean and standard deviation for VAS and Roland Morris Disability Questionaire was assessed and after 6 weeks of study the results showed, there is significant improvement in post-test values of the VAS score of Group C and also there is a significant improvement in post-test values of the RMDQ of Group C than the other two groups. The null hypothesis was rejected. The values were analyzed with SPSS software and placed in data analysis.

Patients had pain relief during a daily activity using core strengthening and Myofascial release technique. The end of the study reveals that GROUP-C had more improvement than the other two groups.

DISCUSSION

Low back pain is a common problem in the general population. In this study, both male and female subjects with pain in the lower back region are been selected. There is a constant weakness of the lumbar region is seen. The measurement of impairment of the low back region of the subjects was taken through the VAS scale and Roland Morris disability questionnaire. Mostly in all the subjects, there was a restriction in the lumbar spine range of motion which was noted and assessed. The treatment protocol was taken for six weeks

After six weeks of study, Group C-core strengthening exercises and myofascial release technique produces better results than the other two groups. According to the tables and graphs, there was a significant difference between the three groups. The table 3 shows that the pretest scores for group A, VAS mean [5.60] and Sd [.828]. For group B, VAS mean [5.86] and sd [.833]. For group C, VAS mean [5.93] and Sd [1.03]. And the post-test score for group A VAS means [4.13] and sd [845]. For group B, VAS mean [4.00] and Sd [.925]. For group C, VAS mean [3.06] and sd [.961]. The table 6 shows that the pretest score of group A, RMDQ mean [59.8] and sd [9.35], For group B, RMDQ mean [61.2] and sd[9.81]. For group C, RMDQ means [64.06] and sd [8.95]. And the post-test score of group A, for RMDQ, mean [45.3] and sd [9.93] for group B, RMDQ mean [43.4] and sd [8.11]. For group C, RMDQ means [35.5] and sd [8.32]. In graph 1, group C, VAS is improved more when compared to the other two groups. And in the second graph group C, RMDQ is improved more than the other two groups.

Core strength training is directed at training the deep trunk muscles (24). The primary role of the core stability muscles is to raise intra-abdominal pressure and to increase the tension in the thoracolumbar fascia. The increase in intra-abdominal pressure stiffens and strengthens the relevant structural support around the spine, compacts the atherogenic structures and in combination with abdominal contraction, it can encourage a rigid cylinder and stiffness to occur around the spine (3). Core stabilization training involves the re-learning of co-activation of co-contraction patterns of transverse abdominis and lumbar multifidus to provide local segment support. When working normally the transverse abdominis and the lumbar multifidus act in concert, increasing tension on thoracolumbar fascia acting like a corset, providing stability to the lumbar spine (1).These exercises restore motion and strength of lower back is helpful in relieving pain and preventing reoccurrence of low back pain (18).

Myofascial release technique (MFR) is one of the most frequently applied and studied osteopathic manipulative treatment techniques. MFR reduces anxiety and depression (4).

MFR reduces the restriction of the lumbar spine range of motion. It effectively breaks down the tissue resistance, erases tissue trauma and re-educates the functionality of the desired body positions (21).

Core strengthening exercise and myofascial release technique are more effective than any other specific exercises. Based on this study shows that there is a significant difference between the three groups, and based on the result that the alternate hypothesis is accepted and the null hypothesis is rejected. In graph group C, VAS is improved more when compared to the other two groups. And in the second graph group C, RMDQ is improved more than the other two groups.

CONCLUSION

The present study concluded that core strengthening exercises and myofascial release technique yielded a significant reduction of pain and improvement in functional abilities in subjects with chronic low back pain. The study reveals that there is a significant difference in all three groups in subjects with chronic low back pain. The alternate hypothesis is been selected. This result suggested that the intervention

of the effect of both the core strengthening and myofascial release technique (Group C) showed greater improvement than the other two groups (Group A and Group B).

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