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Effect of Lumbar Stabilization Exercise and Myofascial Release Therapy in Non-specific Low Back Pain: A Randomized Controlled Trial

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Abstract

Introduction: Low back pain (LBP) is a prevalent health concern among adults, and its prevalence or incidence rises with age, with 50–80 percent of adults suffering from it at some point in their lives. Lumbar Stabilization Exercise (LSE) and Myofascial Release Therapy (MFR) effectively treat LBP for pain relief and functional improvement. However, there is no research comparing the effectiveness of LSE and MFR in patients with non-specific LBP. Thus, this study aimed to compare the effect of LSE and MFR in treating patients with non-specific LBP in terms of pain, range of motion (ROM), low back disability, trigger point number and tenderness grading. **Methodology:** A quantitative research model in the form of an experimental research design was carried out in this study. In this study, 30 subjects suffering from non-specific LBP who met the inclusion criteria were included and randomly allocated into the LSE and MFR groups. The results were collected and analysed using SPSS. **Conclusion:** Both LSE and MFR were beneficial for patients with non-specific LBP. However, MFR was more effective in improving lumbar lateral flexion, rotation ROM, and trigger point reduction when compared to LSE.

Keywords: Myofascial Release Technique, Lumbar Stabilization Exercise, Core Stabilization Exercises, Non-specific Low Back Pain.

INTRODUCTION

Low back pain (LBP) is a frequent health concern among individuals in their working years, and its frequency or incidence rises with age that 50–80% of adults will be experiencing it at some point in their life [1]. The Global Burden of Disease Study listed LBP as a major cause of disability among musculoskeletal conditions and ranked LBP in the top five conditions contributing to loss of disability-adjusted life years [2-4]. LBP is the most prevalent musculoskeletal disorder among adult population with a prevalence approximately 70% in the western world, at some point in their lives. According to the German National Disease Management Guideline for Low Back Pain, LBP is defined as either non-specific or specific based on the aetiology. When there is no clear causal association between the symptoms, physical findings, and imaging findings, back pain is referred to as non-specific. By definition, a pathoanatomical link between the pain and one or more pathological processes, such as compression of neural structures, joint inflammation, or instability of one or more spinal motion segments, can be demonstrated in specific LBP. Specific diagnostic investigations and cause-specific therapy should begin [5]. LBP can be treated with a variety of interventional strategies, such as pharmacological therapy, surgical interventions, or rehabilitation [6]. Currently, physiotherapists have developed various algorithms for diagnosis of the condition and many clinical interventions have been proposed and are used for the treatment of LBP such as pain-relieving modalities, exercise and manual therapy which include mobilization, manipulation, myofascial release technique and other practices [7]. Lumbar stabilization exercise (LSE) is a standard exercise modality used to treat and reduce LBP. It aims to improve the neuromuscular control, strength, and endurance of the muscles that are essential for maintaining dynamic spinal and trunk stability [8-10]. It is thought to be a safe exercise with the benefits of involving multiple stages and low cost [11]. Myofascial release therapy (MFR) is yet another treatment option among the possible management for chronic musculoskeletal pain. MFR is a type of manual medicine that involves applying a low-load, long-duration stretch to the myofascial complex in order to restore the fascial tissue's optimal length, reduce pain, and improve functionality [12]. MFR has been shown to have a significant impact on pain and disability [8][13].

Statement of the Problem

There are previous reports of randomized controlled trials (RCTs) dealing with the effects of LSE and MFR in the treatment of nonspecific LBP. Both LSE and MFR are proven to be beneficial in the treatment of chronic nonspecific LBP for reduction of pain and improvement in functional ability [9][12]. However, there is no study that compare the effectiveness of lumbar stabilization exercise and myofascial release technique in patient with nonspecific LBP. Therefore, this study will be the first RCTs that assess the effect of lumbar stabilization exercise when compared to myofascial release technique in treating patient with nonspecific LBP.

OBJECTIVES OF THE STUDY

General objective is to compare the effect of lumbar stabilization exercise and myofascial release technique in treating patient with nonspecific LBP. Specific objective is to compare effectiveness of both treatment in pain reduction, ROM, low back disability, trigger points number and tenderness grading.

PURPOSE OF THE STUDY

This study helps to find out which treatment is more effective and suitable for general low back pain patients to perform in any settings and anytime. Thus, patients will be more adhered to the treatment and perform the treatment effectively.

METHODOLOGY

A randomized controlled trial was carried out in this study. The study was conducted at outpatient department of Hospital Rehabilitasi Cheras, Kuala Lumpur Malaysia and expected to be completed within the timeframe of 1 year.

Study Sampling

Thirty participants who met the inclusion and exclusion criteria of the study was selected. Subjects were given a consent form and explanation by investigator prior to the study. They were allowed sufficient time to consider their participation in the study. Once they had agreed to participate, they were asked to fill in their name, IC number, and signature on the consent form. Then, they were divided randomly into the Lumbar Stabilization

Exercise group and Myofascial Release Therapy group.

Treatment Duration

Patients had received the respective treatment for 6 weeks which they were asked to perform the treatment 3 days per week. After 6 weeks, they were reassessed.

Inclusion Criteria

(a) all male and female adults between age group of 20–60 years, (b) subjects with non-specific back pain >3 months, and (c) subjects who were willing to participate in the study.

Exclusion Criteria

(a) Patients who had LBP originating from various pathologies, such as presence of cord compression, radiculopathy, osteoporosis, or osteopenia (t score>-1), (b) those who received any treatment for their LBP, (c) using long-term anticoagulant or corticosteroid drugs.

Dependent Variables

1. LBP (low back pain)

Independent Variables

1. Lumbar stabilization exercise
2. Myofascial release therapy

Data Collection Instrument and Procedure

Participants were assessed in terms of pain, range of motion, low back disability, and trigger point palpation during the first and last visits. For pain severity, the visual analog scale (VAS) was used to assess the severity of pain at rest and during activity. VAS is a quick (statistically measured and repeatable) way to classify pain severity. On a 10-cm-long line, patients noted the level of their suffering (0 = no pain, 10 = the most significant pain possible). Next, the modified Schober method was used to assess the lumbar range of motion (ROM). This was measured in a standing position, with the junction of two dimples on the lower back indicated with a marker as a reference line, a line drawn 10 cm above and 5 cm below the reference line, and the patient instructed to bend forward and backward. On both sides, lateral flexion and rotation were requested on command, and measurements were taken with a measuring tape. The differences between these points were recorded. Besides that, the Oswestry Disability Index (ODI), a self-administered questionnaire that evaluates the restrictions of several daily life activities, was used to assess physical disability caused by non-specific LBP. The ODI is one of the most widely used rating systems for LBP sufferers. The total score ranges from 0 to 100, where a higher score indicates a higher level of disability. Lastly was the trigger point palpation. Based on Janet G. Travell, and Lois S. Simons, the physical finding most typically linked with a trigger point is palpation of a hypersensitive bundle or nodule of muscle fiber of harder than normal consistency. In order to locate a trigger point, therapists employed their sense of touch, patient statements of discomfort, and visual and palpable observations of local twitch response. In addition to eliciting a twitch response, this palpation caused discomfort over the palpated muscle, and pain radiated toward the zone of reference. The trigger point's location, number, and tenderness grading were all noted.

Lumbar Stabilization Exercise Group

The LSE group participants were subjected to a lumbar stabilization exercise regime with three days per week for six weeks, for a total of 18 sessions. Each training session lasted 60 minutes, which beginning with a 10-minute warm-up and concluded with a 5-minute cool-down. As the first stage of this exercise, all patients began by learning to activate the abdominal wall musculature. The physical therapist gave a thorough verbal explanation as well as visual instructions (brochure) for the start and finish positions before each exercise. Subjects practiced "hollowing" with a therapist who gave them verbal and tactile feedback until they were confident in their ability to accomplish the move. Each patient's exercise progression was customized based on their capacity, exhaustion, and pain. With a few slight alterations in the order of the exercises and some adjustments in levels of difficulty for some activities, the LSE program was essentially based on the program outlined by Rabin et al. The exercises ranged from 1 set to 3 sets, from 8 to 15 repetitions and contractions from 5 seconds to 10 seconds. Rest intervals were set as 2-3 mins between the exercises. Exercises were done in quadruped, side lying, supine, and upright positions to stimulate a range of trunk muscles. Exercises were ordered by difficulty level in each position, and patients proceeded from one to the next after meeting particular predetermined criteria.

Myofascial Release Therapy Group

The self-myofascial release technique was performed with a lacrosse ball by the patient for 3 days per week for a total of 6 weeks. Tennis balls, golf balls, and lacrosse balls are excellent for this type of massage because their surface area is much less than that of foam rollers. This enables them to target a specific muscle or tissue area. The lacrosse ball massage applications were carried out along four separate myofascial tracks (plantar fascia and short toe flexors, gastrocnemius, hamstrings, and erector spinae) of the superficial backline. The applications were done in supine, sitting or standing positions. Based on the parameter summarized by Dębski et al, the technique was repeated in 3 repetitions (30 secs rest between reps), lasting for 30 s for each myofascial track for 1 set. The position was held for 10-15 seconds when a pain point is found. The degree of depression on a 10-point scale was 7. The duration of self-massage was 15 minutes. During the massage, patient was instructed to breathe slowly and deeply to promote relaxation.

Data Entry and Analysis

The data analysis was performed by using SPSS. The descriptive statistic was used for data analysis, which focus through table and chart. Tabulation and computation of frequencies and percentages were calculated on selected variables.

RESULTS

In the present study, 15 males and 15 females were included which 15 were Malay, 3 were Chinese, and 13 were Indian. The mean age of the subject was 33.17±13.3 years which shows that non-specific back pain occurs mainly in working age group due to the nature of work, lifestyle and stress. Based on the demographic characteristics of study sample, subjects had mean BMI of 23.53±5.05 kg/m2. This reading was almost close to the category of overweight (24.9 kg/m2) which showed that obese/overweight people had an increased prevalence of LBP as seen in previous studies (Table 1).

Table 1. Demographic characteristics of study samples

	Mean (SD)	Frequency	Percentage (%)
Gender			
Male		15	50
Female		15	50
Ethnicity			
Malay		15	50
Chinese		3	10
Indian		12	40
Study group			
LSE		15	50
MFR		15	50
Age	33.17 (13.3)		
Body weight	63.34 (12.9)		
Height	164.40(8.16)		
BMI	23.53 (5.05)		

Note: SD: Standard deviation; LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy

For the LSE group, VAS improvement at rest, VAS during activity, and ODI were significant when compared within the group with P-values of 0.011, 0.001, and 0.001 (Table 2). Besides that, all of the lumbar ROM were significantly improved in the LSE group with P<0.05 (Table 3). However, there weas no significant difference between the pre-post scores for number of trigger point and tenderness grading with P>0.05 (Table 2).

For the MFR group, there was a statistically significant decrease in VAS at rest, VAS during activity, ODI, and the number of trigger point scores between pre- and post-intervention with P<0.05 when compared within group (Table 2). Besides that, all of the lumbar ROM were found to be significantly improved with P<0.05 (Table 3). However, there were no significant changes in tenderness grading scores between pre- and post-intervention for MFR group (Table 2).

When compared between the LSE and MFR groups, there were significant differences in left lateral flexion and right rotation ROM values with P-values of 0.041 and 0.011 (Table 4). With this, the mean rank for MFR group was higher than LSE group, which indicated that MFR was more effective than LSE in improving left lateral flexion and right rotation ROM even though both treatments were found to be beneficial. When the number of trigger

Table 2. Results of ODI, VAS, TG in LSE and MFR Group

	Mean	SD	Percentile		Z	p[a]
			25th	75th		
LSE group						
ODI-pre intervention	7.80	4.62	4.00	12.00	-3.423	0.001
ODI-post intervention	4.00	3.68	1.00	7.00		
VAS at rest-pre intervention	1.40	1.64	0.00	3.00	-2.539	0.011
VAS at rest-post intervention	0.27	0.59	0.00	0.00		
VAS during activity-pre intervention	5.67	1.88	4.00	8.00	-3.455	0.001
VAS during activity-post intervention	3.53	2.26	1.00	5.00		
No. of TPL-pre intervention	1.53	1.55	0.00	2.00	-1.000	0.317
No. of TPL-post intervention	1.47	1.60	0.00	2.00		
TG-pre intervention	0.80	0.68	0.00	1.00	0.000	1.000
TG-post intervention	0.80	0.68	0.00	1.00		
MFR group						
ODI-pre intervention	6.40	3.78	4.00	8.00	-3.442	0.001
ODI-post intervention	3.20	2.98	1.00	5.00		
VAS at rest-pre intervention	0.33	0.62	0.00	1.00	-2.000	0.046
VAS at rest-post intervention	0.07	0.26	0.00	0.00		
VAS during activity-pre intervention	4.33	1.29	3.00	5.00	-3.487	0.000
VAS during activity-post intervention	2.73	1.02	2.00	4.00		
No. of TPL-pre intervention	1.07	1.28	0.00	2.00	-2.630	0.011
No. of TPL-post intervention	0.53	0.74	0.00	1.00		
TG-pre intervention	0.73	0.88	0.00	1.00	0.000	1.000
TG-post intervention	0.73	0.88	0.00	1.00		

Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; SD: Standard deviation; ODI: Oswestry disability index; VAS: Visual analogue scale; TPL: Trigger point location; TG: Tenderness grading; a: Wilcoxon signed ranks test

Table 3. Results of ROM flexion, extension, left and right lateral flexion, left and right rotation in LSE and MFR Group

	Mean	SD	Percentile		Z	p[a]
			25th	75th		
LSE group						
ROM flexion-pre intervention	7.27	2.19	6.00	9.00	-3.207	0.001
ROM flexion-post intervention	9.57	2.54	8.50	12.00		
ROM extension-pre intervention	2.57	0.98	2.00	3.00	-3.078	0.002
ROM extension-post intervention	4.07	1.27	3.00	5.00		
ROM left lateral flexion-pre intervention	12.73	6.36	6.00	18.00	-3.301	0.001
ROM left lateral flexion-post intervention	15.97	5.84	12.00	22.00		
ROM right lateral flexion-pre intervention	12.60	7.18	6.00	19.00	-3.116	0.002
ROM right lateral flexion-post intervention	15.00	6.30	8.00	20.00		
ROM left rotation-pre intervention	2.80	1.11	2.00	4.00	-3.074	0.002
ROM left rotation-post intervention	5.07	3.31	3.00	6.00		
ROM right rotation-pre intervention	2.17	0.99	1.00	3.00	-3.195	0.001
ROM right rotation-post intervention	4.00	1.21	3.00	5.00		

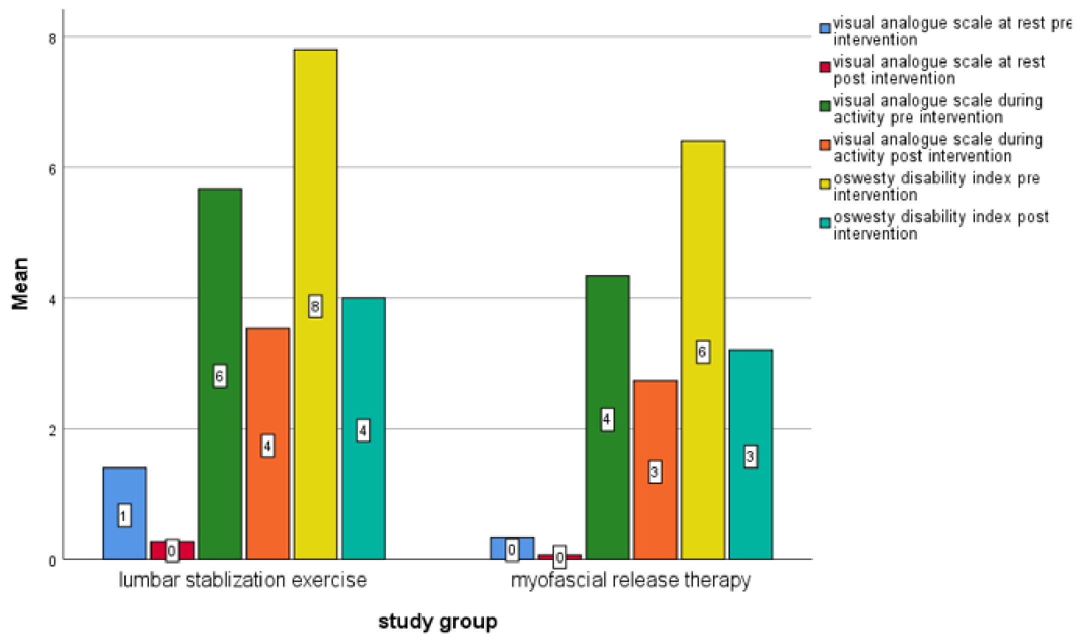
MFR group						
ROM flexion-pre intervention	8.98	4.29	4.00	12.00	-3.190	0.001
ROM flexion-post intervention	10.53	4.01	7.00	13.50		
ROM extension-pre intervention	3.35	1.22	3.00	4.00	-2.988	0.003
ROM extension-post intervention	4.53	1.75	4.00	5.00		
ROM left lateral flexion-pre intervention	19.49	4.76	15.00	24.50	-3.194	0.001
ROM left lateral flexion-post intervention	21.30	4.74	18.00	25.50		
ROM right lateral flexion-pre intervention	18.90	5.79	15.00	23.00	-2.527	0.012
ROM right lateral flexion-post intervention	21.10	4.01	19.00	23.00		
ROM left rotation-pre intervention	3.53	1.37	2.50	4.00	-3.322	0.001
ROM left rotation-post intervention	4.67	1.32	3.00	5.50		
ROM right rotation-pre intervention	4.10	1.56	3.00	5.00	-3.225	0.001
ROM right rotation-post intervention	4.93	1.55	3.50	6.00		

Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; SD: Standard deviation; ROM: Range of motion; a: Wilcoxon signed ranks test

Table 4. Comparison of Outcome Results between LSE and MFR Group

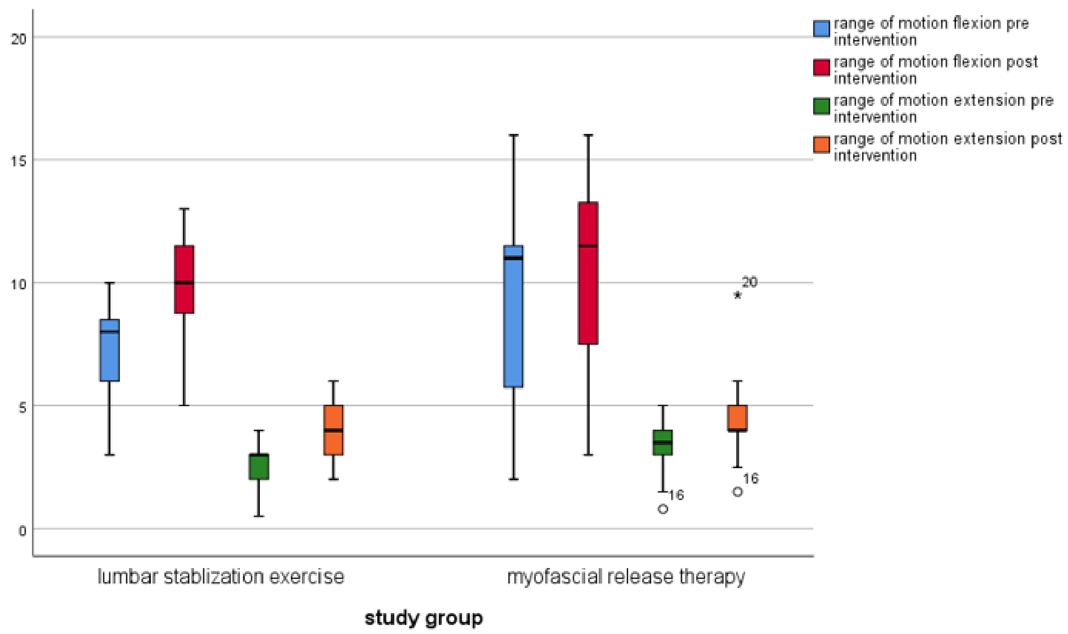
Outcome	Mean Rank	Mean difference	SE difference	95% CI of the difference		U	P[a]
				Lower	Upper		
ODI							
LSE	16.87	0.60	0.62	-0.67	1.87	92.00	0.382
MFR	14.13						
VAS at rest							
LSE	18.17	0.86	0,37	0.088	1.65	72.50	0.059
MFR	12.83						
VAS during activity							
LSE	17.77	0.53	0.30	-0.09	1.15	78.50	0.161
MFR	13.23						
No of TPL							
LSE	12.47	-0.47	0.18	-0.84	-0.09	67.00	0.014
MFR	18.53						
TG							
LSE	15.50	-	-	-	-	112.00	1.000
MFR	15.50						
ROM flexion							
LSE	12.97	-0.73	0.43	-1.63	0.16	74.50	0.116
MFR	18.03						
ROM extension							
LSE	13,07	-0.32	0.49	-1.33	0.69	76.00	0.137
MFR	17.93						
ROM left lateral flexion							
LSE	12.20	-1.42	1.01	-3.49	0.65	63.00	0.041
MFR	18.80						
ROM right lateral flexion							
LSE	13.93	-0.20	1.20	-2.66	2.66	89.00	0.345
MFR	17.07						
ROM left rotation							
LSE	14.33	-1.13	0.97	-3.12	0.86	95.00	0.486
MFR	16.67						
ROM right rotation							
LSE	11.47	-1.00	0.34	-1.71	--0.29	52.00	0.011
MFR	19.53						

Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; SD: Standard deviation; SE: Standard errors; ODI: Oswestry disability index; VAS: Visual analogue scale; TPL: Trigger point location; TG: Tenderness grading; ROM: Range of motion; a: Mann-Whitney test



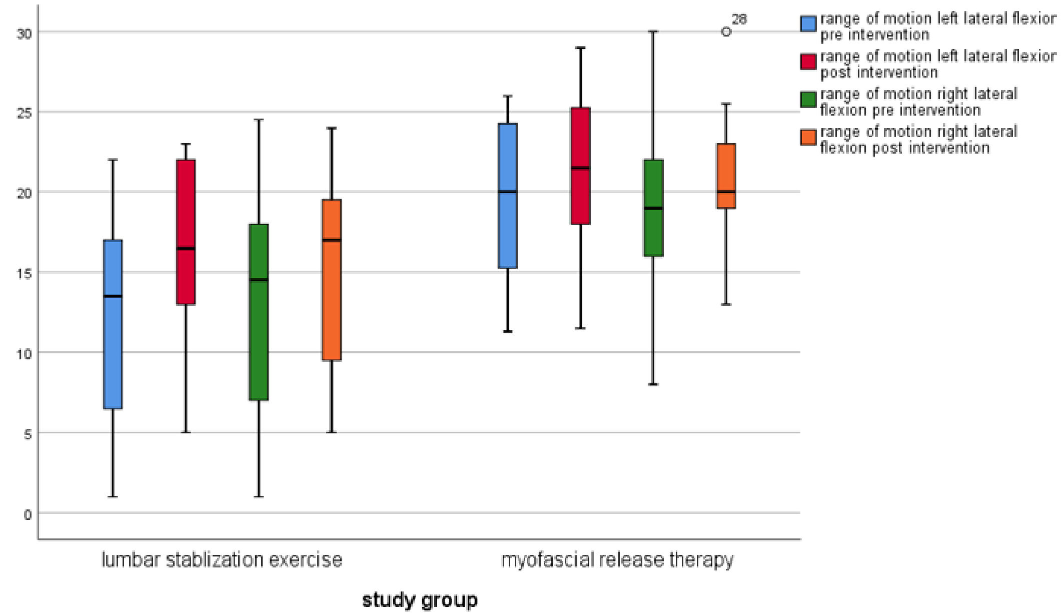
Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ODI: Oswestry disability index; VAS: Visual analogue scale

Graph 1. Distribution of VAS at rest, VAS during activity and ODI in pre and post intervention between LSE and MFR group



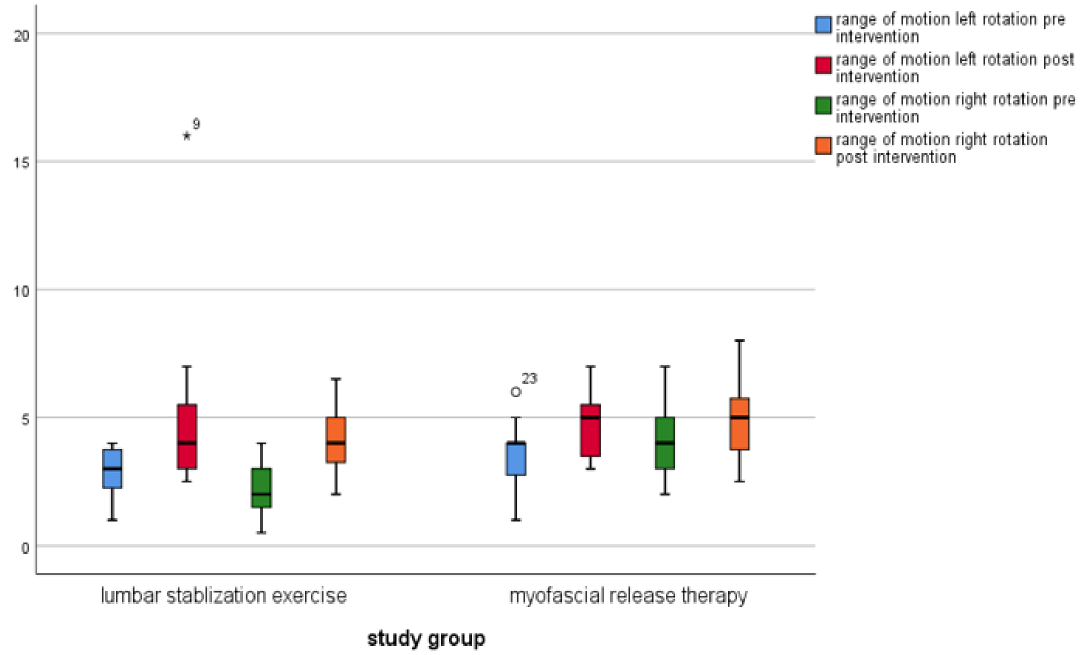
Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ROM: Range of motion

Graph 2. Distribution of ROM flexion and extension in pre and post intervention between LSE and MFR group



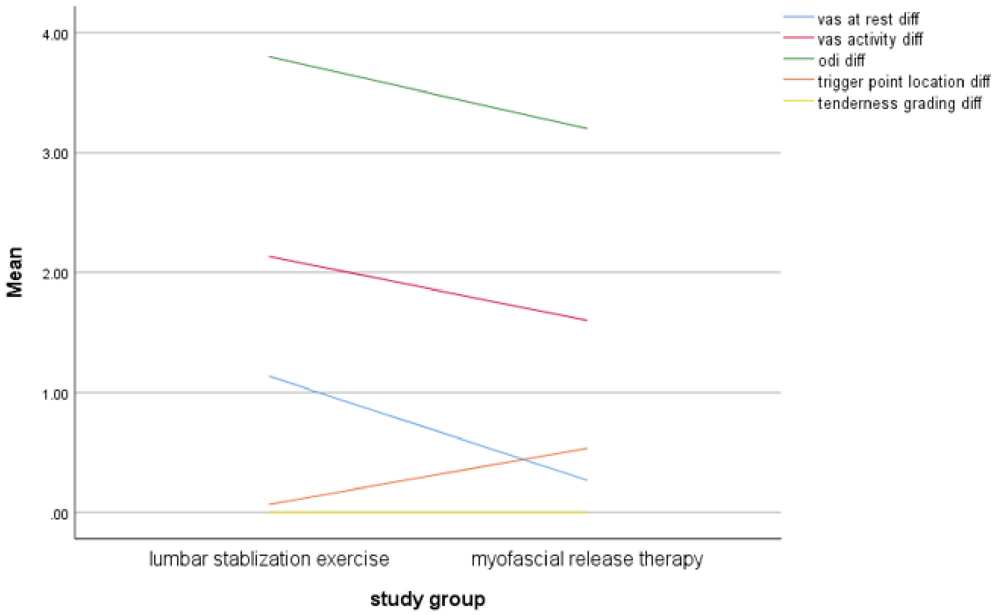
Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ROM: Range of motion

Graph 3. Distribution of ROM left and right lateral flexion in pre and post intervention between LSE and MFR group



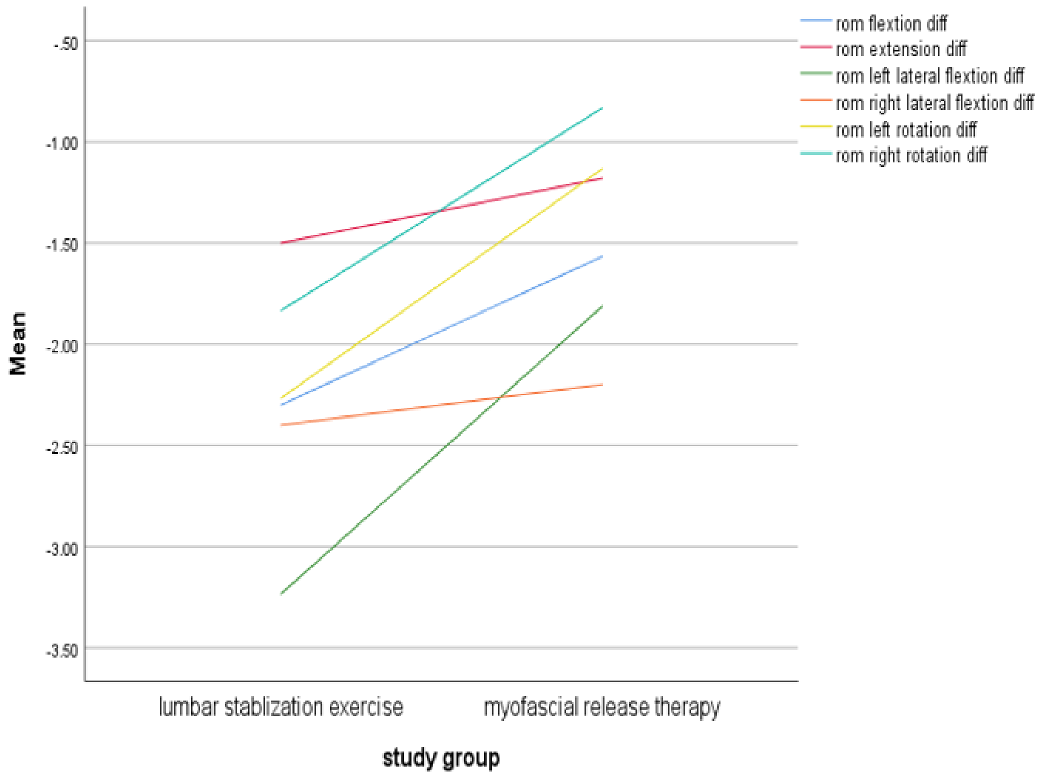
Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ROM: Range of motion

Graph 4. Distribution of ROM left and right rotation in pre and post intervention between LSE and MFR group



Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ODI: Oswestry disability index; VAS: Visual analogue scale

Graph 5. Distribution showing changes after intervention in VAS at rest and during activity, ODI, trigger point location and tenderness grading between LSE and MFR group



Note: LSE: Lumbar stabilization exercise; MFR: Myofascial release therapy; ROM: Range of motion

Graph 6. Distribution showing changes after intervention in ROM flexion, extension, left and right lateral flexion, right and left rotation between LSE and MFR group point was assessed, there was a significant difference between the LSE and MFR groups with P-values of 0.014 (Table 4). According to our findings, the mean rank for the number of trigger points was more significant in the MFR. This proved that MFR had more effect in reducing number of trigger points when compared to LSE, which does not have a significant effect on trigger point reduction.

DISCUSSION

The findings of our study found that both LSE and MFR were beneficial for the management of pain, limited ROM, and low back disability in patient with non-specific LBP. However, the improvement in left lateral flexion ROM, right rotation ROM and reduction of trigger point number were more significant in MFR group compared to LSE group. In the process of treatment prescription and data collection, we found that MFR was more understandable and easier to perform by patient in any setting. Unfortunately, most of the patients will tend to hold their breath during drawing-in maneuver in LSE which may cause several adverse effects. Besides that, LSE is more challenging for older age patient as the progression in position may be difficult for them to perform. Concerning the accessibility, lower difficulty and effectiveness, MFR is more recommendable for patient with non-specific LBP compared to LSE.

CONCLUSION

In conclusion, LSE and MFR are both useful for pain relief at rest and during activity, improving lumbar ROM and reducing functional disability. In the presence of a trigger point, MFR aids in the reduction of the number of trigger points, but LSE has no effect. However, when compared, this study suggests that MFR works better in improving lumbar ROM in patients with non-specific LBP. It is easier for patients to understand and perform.

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