Original Article

Effect of Active Release Versus Myofaseial Release Technique in Low Back Myofascial Pain Syndrome

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DOI: 10.47750/pnr.2023.14.S02.83

Abstract

Background: low back Myofascial pain syndrome is a disorder triggering pain at myofascial trigger points is a frequent source of pain in clinical practice. Both Active release technique and myofascial release technique help in improving low back myofascial pain. **Purpose** of this study to compare the effect of Active Release Technique with myofascial release technique on pain pressure threshold as well as functional disability in low back myofascial pain syndrome with active trigger points. **Methods:** forty five male and female with low back myofascial pain syndrome, participated in the current study, had been divided into three groups randomly. **Group A** received conventional physiotherapy in addition to active release technique for active trigger points of Iliocostalis Lambourum and Gluteus Medius muscle. **Group B** received conventional physiotherapy in addition to myofascial release for active trigger point of Iliocostalis and Gluteus Medius. **Group C** (control group) received conventional physiotherapy only in the form of stretching and strengthening exercises. The treatment was conducted two sessions per week for one month, all participants evaluated pre and post treatment by Wagner FPX25 digital algometry was utilized to measure pain pressure threshold and Ronald Morris disability Questionnaire to measure function disability of low back pain. **Results**: pre -treatment no significance difference has been detected among groups ($p > 0.05$). Post treatment, showed a significant increase in the pressure pain threshold of active trigger point of Iliocostalis and Gluteus Medius muscle and a significant decrease of Ronald Morris disability Questionnaire score in **group A** more than that of **group B** ($p < 0.01$) and group A more than that of group **C** ($p < 0.01$). **Conclusion**: The active release technique increases threshold of active trigger points of Iliocostalis and Gluteus Medius more than myofascial release, also improves back function disability more than myofascial release technique in low back myofascial pain syndrome.

Key words: Active release technique, lower back Myofascial pain syndrome, triggers points, myofascial release technique.

INTRODUCTION

Myofascial pain syndrome (MPS) is non-articular local musculoskeletal pain syndrome caused by myofascial trigger points (MTrPs) located at muscle, fascia, or tendinous insertions. Myofascial syndrome affects up to 95% of people with chronic pain disorders (1).

Myofascial pain syndrome is one of the most common cause of pain and disability among individuals with musculoskeletal pain, this myogenic syndrome can affect skeletal muscles, connective tissues, and fascia of the back (2). It accounts for 20% to 95% of patients with musculoskeletal pain presenting at general medical clinics and pain management centers, despite the prevalence of MPS, awareness among clinicians is still inadequate, which results in this condition often being misdiagnosed or underdiagnosed and thus under-treated (3).

Myofascial trigger point (MTrP) is a hyperirritable point in skeletal that associated with hyper sensitive nodule. Defined as ‘‘a hyperirritable spot, a usually within taut band of skeletal muscle or in the muscle fascia which is painful on compression and can give rise to characteristic referred pain, motor dysfunction (4).

MTrPs are thought to be the primary source of pain in clinical settings (5). In contrast to other types of chronic pain, myofascial pain syndrome appears to be an excessively severe disorder of the musculoskeletal system. Although males and females are equally at risk for developing MPS. Although affects primarily adults (ages 27-50) but can affect as many as 54% of women as well as 45% of men. (6).

Trigger points limit muscle movement and blood flow, starving the muscle of oxygen as well as nutrients and leading to a buildup of waste products from the body's metabolism that cannot be eliminated. These toxins both stimulate and destroy pain receptors. Spasm and inflammation increase when muscle nutrition is reduced (7).

Trigger points may develop after an initial injury to muscle fibers. This injury may include a noticeable traumatic event or repetitive micro trauma to the muscles (8). The trigger point causes pain and stress in the muscle or muscle

fiber. As the stress increases, the muscles become fatigued and more susceptible to activation of additional trigger points. When predisposing factors combine with a triggering stress event, activation of a trigger point occurs (9).

The Clinical characteristics of low back myofascial pain syndrome are pain distribution pattern, restricted range of motion with increased sensitivity to stretching, weakened muscle due to pain with no muscular atrophy, compression causing pain similar to the patient's chief complaint, a palpable taut band of muscle correlating with the patient's trigger point local twitch response elicited by snapping palpation or rapid insertion of a needle Reproduction of the referred pain with mechanical stimulation of trigger points (10).

Low back Myofascial pain syndrome can be acute or chronic condition. Both acute and chronic pain is characterized by a dull deep aching that is both diffuse and broadly distributed. Further, MTrPs may cause the typical "sharp" or "stabbing" pain associated with their condition. There are also a taut bands in the muscles, localized weakness or tenderness, radial or repeated pain, restricted range of motion (ROM), and/or heat and red skin Chronic muscle stiffness, a hard, perceptible muscle texture, early muscle exhaustion (11).

Management of myofascial pain syndrome are medications as Painkillers, antidepressants, or antiepileptics drugs can be prescribed; as well as physiotherapy techniques as trigger points release, stretching exercise, manual therapy approaches, dry needling, electro therapeutic modalities are commonly used to treat MPS, with the goals of pain management and range of motion (ROM) improvement (12).

The goal of the non-invasive treatment known as Active Release Technique (ART) is to identify and break down adhesions in soft tissue which are responsible for pain, stiffness, as well as physical dysfunction (13).

Michael L. (2012) explained a mechanism of the cumulative damage cycle, to explain the observed stiffer or tenser tissues, the cumulative cycle is produced by the micro-injuries that occur repeatedly in overused muscles, which in turn increase the friction as well as tension within the myofascial tissues, both the "chronic cycle" and the "inflammation cycle" result from this tension, with the latter cause a reduction in blood flow to the affected area.

Myofascial release (MFR) is the practice of applying a low load for a prolonged period of time in order to stretch the myofascial complex to reduce pain and enhance function. (15). Up to the available knowledge there was no studies compared impact of active release with myofascial release technique in low back myofascial pain syndrome. So, this study was done to compare the effect of Active Release Technique with myofascial release technique on pain pressure threshold as well as functional disability in low back myofascial pain syndrome with active trigger points. Results of this study could help physical therapists in decision making of treating low back myofascial pain.

Materials and Methods

This study was carried out in physiotherapy department Materia Teaching Hospital, Cairo, Egypt.
It was designed to compare the effect of Active Release Technique with myofascial release on pain pressure threshold as well as functional disability in low back myofascial pain syndrome with active trigger points.
Forty five Participants, male and female, were diagnosed by Orthopedist as low back myofascial pain syndrome with at least, one active trigger point of Iliocostalis and Gluteus Medius muscle , with age from 18 to 43 years (16**).**
The participants were assigned into three groups randomly (fig.1)

Group A: 15 participants received conventional physiotherapy as well as active release technique for active trigger points of target muscles.

Group B: 15 participants received conventional physiotherapy as well as myofascial release technique for active trigger points of target muscles.

Group C: 15 participants received conventional physical therapy only

Participant had, at least, one active trigger points in each of Iliocostalis Labarum, Gluteus Medius muscle, local twitch response and pain lasting from zero to two weeks, were included in the study. Pregnant women, participants suffering from neurological or musculoskeletal disorders, motor weakness, infection or skin lesions or participants with sensory disorders or under gone back spinal surgery were be excluded.

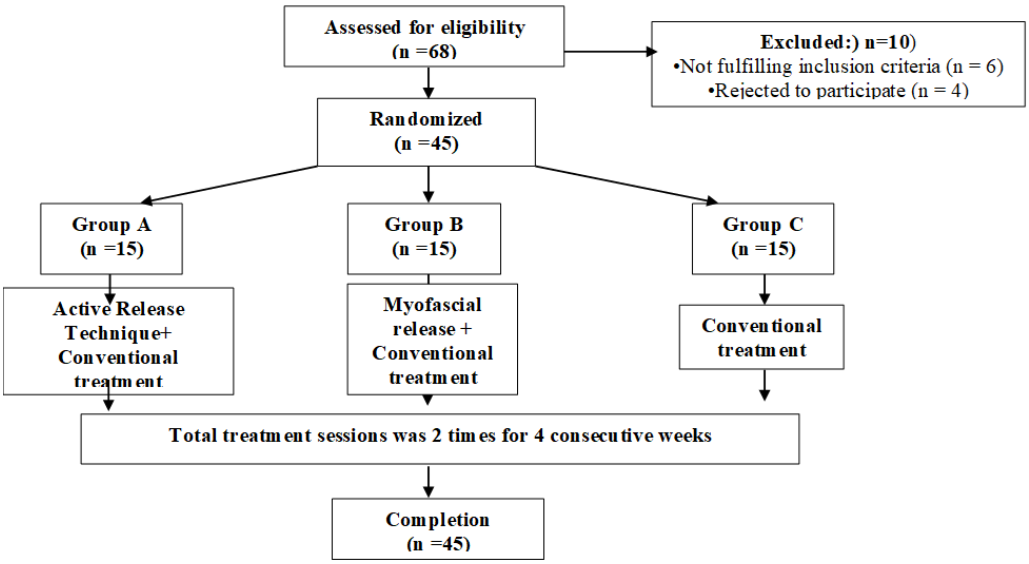

Figure (1): Diagram of the study design

Procedure

The purpose and procedure of the study was explained for each participant. The study was approved by the Faculty of Physical Therapy's ethical committee of Cairo University in Egypt No: **P.T. REC \012\002033** prior to beginning the study; each participant signed an informed consent form.

The following data was recorded at the starting of the study: personal data; name, age (year), weight (Kg) height (cm) as well as calculated body mass index (BMI) at personal information sheet.

Instrumentation and Tools for Measurement

1-**Digital pressure algometry**

The Wagner FPX2 Algometry Figure (2) was used. It has been stated that pressure algometry is an objective approach to determining a trigger point's pressure pain threshold (PPT) in musculoskeletal disorders, PPT is the amount of pressure at which an individual's experience pain or tenderness. Numerous studies have shown that pressure algometry is a reliable method for measuring regional pain threshold as well as tenderness. Most of musculoskeletal disorders have been using PPT values **(17).**

Figure (2): digital pressure algometry

2- **Ronald Morris disability Questionnaire (RMQ)** is a reliable and also valid Questionnaire for measurement of Low back pain (LBP) functional disability level. It is consisted of 24 items impact profile adapted for LBP varying from 0 (no disability) to 24 score (sever disability) (18).

Procedure for measurements

Pressure pain threshold Measurement

Investigator performed the PPT (Kg) measurement utilizing the WangerFPX2 algometry recorded by therapist. It was calibrated at the start of every testing session, with the Iliocostalis lambourum and Gluteus Medius muscles compressed with the same speed. Whenever the pressure turned into pain, the participant was instantly reacted to, and also the mechanical pressure value was documented as the mean of three measurements. The testing muscles (Iliocostalis Lambourum and Gluteus Medius) were identified by placing pen markings on the skin at the trigger points of those muscles. PPT was measured pre and post treatment time **(19).**

Measurement of back functional disability level

Ronald Morris disability Questionnaire is more sensitive for patient's moderate back disability level. It is a sensitive self-cognition tool used to measure the degree of functional impairment due to back pain. It is consisted of 24 items impact profile adapted for low back pain varying from 0 To 24 score. The higher the score the more disability level is **(20).**

Procedure for treatment

Conventional physical therapy

Stretching and strengthening exercise for Iliocostalis Lambourum and Gluteus Medius muscles, stretching exercise for Iliocostalis Lambourum from long sitting, ask participant to lean forward as much as possible and hold for six sec and return to starting position, for its strengthening Back extension exercise was done from prone with pillow under the abdomen exercise was done ten times with hold for six second at the end of rang. Stretching for Gluteus Medius from crock lying position as putting leg over leg with knee flexed 90 degree in abduction direction. Strengthening for Gluteus Medius from sid lying position by lifting the top leg without rolling the pelvis backward hold for six seconds three sets of ten repetitions for 12 sessions two sessions per week for one month (**21)**.

Myofascial release technique for Iliocostalis lambourm and Gluteus Medius

1-Myofascial release technique (MFR) for Iliocostalis lambourum muscle

participant positioned in prone lying therapist was standing beside the treatment table at the waist level counter pressure performed by one hand against the ribs in a cephalic direction and with the other hand using the knuckles to apply vertical stroking caudally over its course and sustained pressure was applied following the tissue direction, over barrier for at least of 2 minutes or till release took place (**22**).

2-Myofascial release technique (MFR) for Gluteus Medius muscle

Participant was in side-lying position on the non-involved side, with the side treated the upper most. The participant's upper arm was raised above the head and hold on to the treatment table, to raise the chest; the upper leg was in extension as well as adduction (dropping the upper most knee behind the lower most knee) to pull the pelvis distally and lowering the iliac crest. A pillow was used below the non-involved side to open up a broader space. The therapist stood behind the subject at waist level, applying counter pressure using one hand upon the ribs in a cephalic direction and with the other hand using the knuckles to apply vertical stroking caudally over its course, with pressure exerted along the tissue three- dimensional, barrier after barrier is released. For at least two minutes, or till a release is gained. **(22)**

Active release technique for Iliocostalis Lambourm and Gluteus Medius muscles

1-Active release technique for Iliocostalis lambourm

Participant was in sitting position while hands crossing the chest and the therapist were stand behind the patient. Therapist detected the active trigger points of Iliocostalis muscle and perform firm pressure on it then ask participant leaning forward with rotation to the other side then return to starting position while the muscle is shortened for 12 sessions two sessions per week for one month (**23).**

2-Active release technique for Gluteus Medius

Active Trigger point ART for the Gluteus Medius muscle. Throughout ART therapy, the clinician utilizes deep digital tension (with the thumb or fingers) on the involved area while actively as well as passively moving the tissue from either a shortened to a lengthened position, or vice versa. The typical treatment session lasts between five and eight minutes per area. The most effective position for the patient is to lie on side lying position. The trigger points within Gluteus Medius muscle are located and treated with direct, firm pressure from the top to the bottom by the therapist. The next step is to have the patient flex his or her lower leg from a neutral position to the fully flexed hip range and back again while the therapist maintains pressure on the trigger point. 12 sessions two sessions per week for one month (**24)**

Data Analysis

- Data were summarized using descriptive statistics of mean, standard deviation for quantitative variables and frequencies, percentages for categorical variables.

– The chi-squared test was performed to compare sex distribution between the groups.

-The homogeneity of the groups was tested utilizing Levene's test for homogeneity of variances.

– Mixed MANOVA was performed to compare within and among group effects on PPT of Iliocostalis lambourum and Gluteus Medius active trigger points. As a result of the need for further multiple comparisons, post-hoc tests with the Bonferroni correction were performed.

Value of $p < 0.05$ was considered to indicate statistical significance.

-The Windows version of the SPSS statistical software (version 25) was used for all analyses (IBM SPSS, Chicago, IL, USA).

Sample size

Sample size estimation was based on power analysis the G* power 3.1 software (Heinrich Heine University Dusseldorf Germany) was used with power 80% and probability 0.05

Results

Participant's characteristics

The differences among groups A, B, and C were presented in table (1). Distributions of age, weight, height, body mass index, as well as sex did not vary significantly ($p > 0.05$) between groups.

Table (1): Basic characteristics of participants**.**

	Group A	Group B	Group C	F- value	p-value
	Mean ± SD	**Mean ± SD**	**Mean ± SD**		
Age (years)	28.73 ± 7.60	29.06 ± 6.32	27.53 ± 6.92	0.20	0.81
Weight (kg)	75.73 ± 8.53	73.8 ± 6.54	77.06 ± 6.20	0.78	0.46
Height (cm)	170.26 ± 6.59	170.8 ± 5.61	171.73 ± 8.56	0.16	0.84
BMI (kg/m²)	26.16 ± 3.05	25.32 ± 2.27	26.21 ± 2.38	0.56	0.57
Sex, n (%)					
Females	3 (20%)	4 (27%)	4 (27%)	(χ^2 = 0.24)	0.88
Males	12 (80%)	11 (730%)	11 (73%)		

SD: Standard deviation. χ^2: Chi squared value. p value: Probability value.

Effect of treatment on PPT of trigger point of Iliocostalis and Gluteus Medius muscle and on Ronald Morris questionnaire (RMQ) score.

Mixed MANOVA revealed an interaction effect of treatment as well as time (F = 29.98, p = 0.001). There was a significant main effect of treatment (F = 20.24, p = 0.001). There was a significant main effect time (F = 864.13, p = 0.001).

Within group comparison

There was a significant increase in the PPT of active trigger point of Iliocostalis and Gluteus Medius muscle post treatment compared to that pretreatment in group **A**, **B** and **C** (p < 0.001). The percentage of change in PPT of active trigger point of Iliocostalis and Gluteus Medius in **group A** was 82.93 and 101.02% respectively and that in **group B** was 44.33 and 74.40% respectively whereas that in **group C** was 30.11 and 41.91% respectively, table (2), figure (4).

There was a significant decrease in RMQ score post treatment compared to that pretreatment in group A, B and C (p < 0.001). The percentage of change in RMQ score of **group A**, **group B** and **group C** was 78.54, 64.6 and 50.75%% respectively, table (2), figure (4).

Between groups comparison

Pretreatment, there was no statistically significant difference between the groups in PPT and RQM (p > 0.05). post Trigger point therapy: PPT of the Iliocostalis as well as Gluteus Medius muscles increased significantly after treatment in **Group A** compared to **group B** and **C** and increased in **group B** compared to **group C** (p < 0.01) , whereas the RMQ score decreased significantly (p < 0.001) in **groups A** and **B** compared to **group C.**

There was a significant increase in the PPT of active trigger point of Iliocostalis and Gluteus Medius muscle and a significant decrease of RMQ score in **group B** compared to that of **group C** (p < 0.01, table (2), figure (3-4).

Table (2): ***Mean of PPT of target muscles and RMQ score pre and post treatment of group A,* B *and* C**

			Group A	Group B	Group C	p-value		
			mean ± SD	**mean ± SD**	**mean ± SD**	**A vs B**	**A vs C**	**B vs C**
PPT (kg)								
Iliocostalis								
Pre treatment	2.87 ± 0.21	2.82 ± 0.23	2.79 ± 0.22	1	1	1		
Post treatment	5.25 ± 0.38	4.07 ± 0.35	3.63 ± 0.31	0.001	0.001	0.006		
MD % of change	-2.38 (82.93%)	-1.25 (44.33%)	-0.84 (30.11%)					
	p = 0.001	***p = 0.001***	***p = 0.001***					
Gluteus Medius								
Pre treatment	1.97 ± 0.11	2.07 ± 0.17	1.98 ± 0.31	0.73	1	0.88		
Post treatment	3.96 ± 0.32	3.61 ± 0.38	2.81 ± 0.27	0.01	0.001	0.001		
MD % of change	-1.99 (101.02%)	-1.54 (74.4%)	-0.83 (41.91%)					
	p = 0.001	***p = 0.001***	***p = 0.001***					
RMQ								
Pre treatment	14.26 ± 3.69	13.73 ± 3.47	13.93 ± 3.93	1	1	1		
Post treatment	3.06 ± 1.75	4.86 ± 1.35	6.86 ± 1.06	0.004	0.001	0.001		
MD % of change	11.2 (78.54%)	8.87 (64.6%)	7.07 (50.75%)					
	p = 0.001	***p = 0.001***	***p = 0.001***					

PPT: pain pressure threshold. MD: mean difference. SD: Standard deviation. P-value, p value: Probability value.

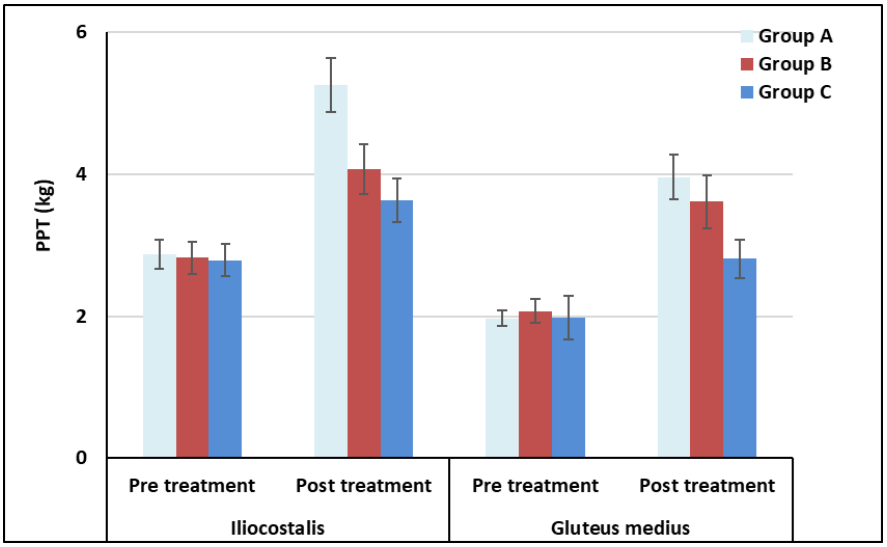

Figure (3): Mean PPT of Iliocostalis and Gluteus Medius pre and post treatment of group A, B and C

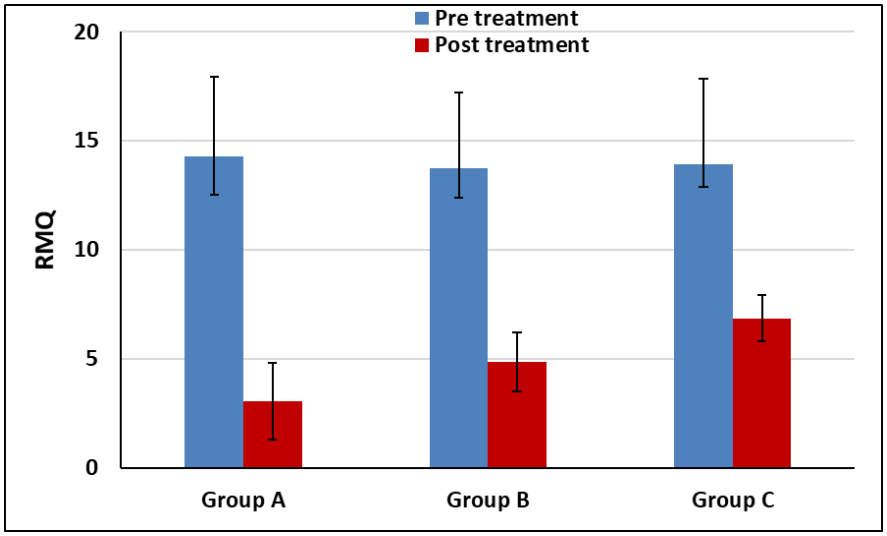

Figure (4): Mean RMQ of Iliocostalis and Gluteus Medius muscle pre and post treatment of group A, B and C

Discussion

The low back is a frequent site of pain for those suffering from MPS, a condition that affects the muscles and tendons, give sensory and motor manifestations as well as autonomic problems brought on by myofascial trigger points are collectively referred to as MPS which lead to a potential source of referred pain and referred tenderness [25].

The current study was conducted to compare the effect of ART with MFR on pain pressure threshold as well as functional disability in low back myofascial pain syndrome with active trigger points on Iliocostalis Lambourm and Gluteus Medius muscles, Forty-five participants with ages from18 to 43 years old were diagnosed, and referred by Orthopedist, as myofascial low back pain syndrome, shared in the current study, and all participant were measured pre and post the treatment program by Wagner FPX25 digital algometry was utilized to measure pain pressure threshold and Ronald Morris disability Questionnaire to measure function disability of low back pain which are valid and reliable(17) (18). Participants received the treatment eight sessions; two sessions a week for one month (23).
The results of the current study showed that both ART and MFR in treatment low back myofascial pain syndrome but ART more significant effect in increase pain threshold and improvement of back function.

These results may be related to ART used to treat the change in muscles and soft tissues resulting from incorrect long-term posture as ART very effective in releasing and break down adhesions of soft tissues so decreasing pain, muscle spasm, muscle fatigue and numbness. (26)

These results supported by Robb et al. (2011) who found that ART more effective in treatment adductor active trigger points and strain immediately. Further, Tak et al. (2013) found that patients with low back pain who received ART on their Gluteus Medius active trigger points for 3 weeks had increase in PPT.

Nambiraja U et al.(2019) who suggested that MFR group and ART group shows after 2 weeks there were a significant reduction in Visual analogue scale (VAS), as treatment of subjects with Piriformis trigger points ,ART group showed better result when it was compared with stretch group and MFR technique group. While this study revealed within group differences in VAS in all groups and between group differences in ART technique reveal positive effects of pain reduction and suggest that ART may offer a potential advantage of this mode over other groups which agree with current study.

Mishra et al. (2018). Reported that there was no significant difference between myofascial release technique and ART in treatment of upper fiber of trapezius trigger point and this disagreed with the current study may be related to small sample size.

Manashi Dey and Shilpi Pal. (2022) doing mini review to identify the effectiveness of the two **t**echniques ART and MER in reducing pain and spasm for subjects with Trapezius trigger points found that ART and MFR are soft tissue manipulation techniques practiced by physiotherapists for reducing muscle spasm and pain**.** Concluded that both are effective therapeutic option in terms of treatment of active myofascial trigger points, which agree with this study.

Clinical importance

Active release technique and myofascial release technique could be used in treatment of low back MPS and both could be used in treatment of musculoskeletal injuries. According to the results of current study the percentage of change post treatment of ART more than 20 % (101% for PPT and 78.54 for RQM) so ART showed more significant improvement in management of low back MPS with active trigger points in increasing PPT and decreasing back functional disability. So ART is considered as clinical important in physical therapy program of low back MPS with active trigger points and help in returning to normal daily living activities.

Ethical statement

The current research related to human use, has completed with all relevant national regulation and institutional policies and has been approved by the Faculty of Physical Therapy's ethical committee of Cairo University in Egypt No: P.T. REC \012\002033. Prior to beginning the study, each participant singed an informed consent form.

Conclusion

Active release technique decreases pain level, increases pressure pain threshold and improves functional back disability greater than the myofascial release technique in patients with low back myofascial pain syndrome with active trigger points.

Conflict of interest

The authors state no conflict of interest

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