Effectiveness of Myofascial Release Technique in Management of Patients with Chronic Low Back Pain

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ABSTRACT

Background: *Chronic lumbar dysfunction is a poorly understood condition causing substantial disability and health care costs worldwide. Myofascial abnormalities may lead to connective tissue fibrosis, increased tissue stiffness and further movement impairment which may contribute to LBP chronicity.* ***Purpose:*** *to determine the effectiveness of myofascial release (MFR) intervention in management of patients with chronic low back pain.* ***Methods:*** *forty patients (male and female), their age range 30-56 years, with chronic low back pain (more than three months) were assigned randomly to two equal groups. The first control group (n=20) underwent a four weeks specific physical therapy program (3x/w/4wks). The second experimental group (n=20) underwent a four weeks specific myofascial release intervention plus the physical therapy program (3x/w/4wks). Outcome measures include pain intensity, lumber movements and functional disability index were measured.* ***Results:*** *myofascial release technique showed a statistically significant (P< 0.05) reduction in pain intensity from (8.31±1.59) to (5.36±1.56) and functional disability levels from (55±10.07) to (33.57±11) and also revealed a statistically significant improvement in the lumbar spine rang of movement from (27.89±12.7) to (41.05±8.36).* ***Conclusion:*** *The outcomes of this trial confirm the effectiveness of MFR in reducing pain and functional disability in patients with chronic low back pain.*

Key words: *Myofascial release, chronic low back pain, outcome measures.*

INTRODUCTION

Low back pain (LBP) is a significant heath problem that affects 80% of the general population at some point in their life time. Incidence of low back injuries are reported to be high for industrial workers operating in fixed postures. Chronic lumbar dysfunction is a poorly understood condition causing substantial disability and health care costs worldwide[30]. Lumbar dysfunction is a serious health problem affecting 80% of people at some time in their life. It affects the mobility of the lumbar region and adjacent joints leading to functional disability[9]. Anatomically, thoracolumbar fascia consists of three layers. The anterior and middle layers arise from the transverse processes of the lumbar vertebrae and join together laterally, encompassing the quadrates lumborum while blending with the fascia of the transverses abdominis and internal oblique abdominis muscles. This creates a direct connection between the bony spine and the deep abdominal muscles and appears to be an important relationship for the dynamic stabilization of the lumbar spine[4]. The delay in recruitment pattern of trunk stabilizer results in decreased muscle stiffness and poor spinal segmental control[12].

Myofascial release techniques (MFR) are a group of specific maneuvers that are directed toward the soft tissues of the body, particularly the muscles and fascia. Muscle and fascia are most commonly thought of as the tissues treated by these techniques, but all of the fibroelastic connective tissues, as well as skin, tendons, ligaments, cartilage, blood, and lymph, may be affected[11].

Ward describes myofascial release technique as "designed to stretch and reflexly release patterned soft tissue and joint-related restrictions". This style of osteopathic manipulation has historical ties to early osteopathic manipulative treatment and soft tissue technique. The education council of osteopathic principles has defined myofascial release technique as a "system of diagnosing and treatment first described by Andrew Taylor Still and his early students, which engages continual palpatory feedback to achieve release of myofascial tissues"[31]. In contrast, the non-specialized connective tissues forming the fascial planes of the back have received little attention. Myofascial abnormalities may lead to connective tissue fibrosis, increased tissue stiffness and further movement impairment which may contribute to LBP chronicity[21].

A recent focus in the physiotherapy management of patients with chronic back pain has been the specific manipulative techniques. This program is proposed to integrate with physical therapy program for best benefits of patient to provide dynamic stability and fine control to the lumbar spine.

SUBJECTS, MATERIALS AND METHODS

Subjects

Criteria for inclusion in the study were restricted to 40 patients of either gender between the ages of 30 and 56 years and had persisted low back pain longer than 3 months[7].

Instrumentations

A- For Evaluation:

1. Pain measures: a visual analogue pain scale (VAS) was used to assess each patient's average symptoms[22].
2. Lumbar spine range of movement in standing: This was measured using inclinometers[20].
3. Functional measures: The Oswestry disability questionnaire was used[13].

B- For intervention:

1. Infrared Radiation (IRR): model is 2004/2 N, a power of 400 w, voltage 203 v and frequency of 50/60 Hz.
2. Ultrasonic Device: Phyaction U 190, 230 V, 300 mA/50-60 Hz, Plus: 8 w.
3. Transcutanous Electrical Nerve Stimulation (TENS): (Dc: 6 v, Watts: 6 w, CE: 0120).

Treatment Procedure:

Both treatment group are received the following intervention protocols 3x/ w/4wks, IRR, ultrasonic, TENS, therapeutic exercise program (finger to toes, bridging exercise, back extension from prone, sit-up exercise, knee to chest exercise and stretching lower back muscles). At this point the experimental group was received MFR intervention for psoas muscles, hamstring, tensor fascia lata and iliotibial band, piriformis, lateral abdominal muscles and quadrates lumborum, and erectrospinea muscles while the control group is discharged[1].

RESULTS

Statistical analysis revealed no statistically significant differences between CG and MFR groups on entry to the trial. Analysis of differences within each group after the intervention period revealed significant differences in the MFR group after the intervention period, with a decrease in pain intensity ($t = 7.15$, $P < 0.0001$) and a reduction in functional disability levels ($t= 9.04$, $P < 0.0001$) and lumbar spine ROM improvement (flex, ext, R & L) side bending ($t= 4.77, 8.72, 7.68, 5.63$ and $P < 0.003, 0.001, 0.002, 0.004$ respectively), (Table 2). CG, however, had no significant difference, on the basis of pain intensity scores and functional disability levels after the intervention period. A statistically significant, but clinically insignificant, reduction in pain intensity ($t = 4.86$, $P = 0.001$), decreased in functional disability level ($t= 4.64$, $P < 0.0001$) d and lumbar spine ROM (flex, ext, R & L) side bending ($t= 1.67, 2.74, 3.15, 3.2$ and $P < 0.11, 0.01, 0.005, 0.005$ respectively) were detected in the control group (Table1).

Statistical analysis revealed no statistically significant differences between both groups on entry to the study. Analysis of differences within each group after the intervention period revealed significant differences; (Table 2).

MFR group revealed a statistical significant difference between pre and post treatment; pain intensity level as the pain level pre treatment was (8.31±1.59) and for post treatment was (5.36±1.56) where the t-value was (7.15) and P-value was (0.0001), there was a significant difference between pre and post treatment lumbar flexion ROM as the lumbar flexion ROM pre treatment was (27.89± 12.7) and for post treatment was (41.05±8.36) where the t-value was (4.77) and P-value was (0.003), there was a significant difference between pre and post treatment lumbar extension ROM as the lumbar extension ROM pre treatment was (7.89±3.74) and for post treatment was (15.78±6.74) where the t-value was (8.72) and P-value was (0.001), there was a significant difference between pre and post treatment lumbar (Rt) side bending ROM as the lumbar side bending

ROM pre treatment was (6.57±3.64) and for post treatment was (10.52±3.58) where the t-value was (7.68) and P-value was (0.002), there was a significant difference between pre and post treatment lumbar (Lt) side bending ROM as the lumbar side bending ROM pre treatment was (6.89±3.68) and for post treatment was (11.05±4.16) where the t-value was (5.63) and P-value was (0.004), and finally, there was a significant difference between pre and post treatment functional disability as the functional disability pre treatment was (55±10.07) and for post treatment was (33.57±11) where the t-value was (9.04) and P-value was (0.0001) as shown in table (1).

Two samples paired t-test revealed that there was no significant differences between group (A) and (B) in the combined dependant variables pre-treatment, while revealed a statistical significant differences between both groups in the combined dependant variables post-treatment as shown in table (2).

Pre treatment there was no significant differences between group (A) and (B) in: (I) pain intensity level where the t-value was (0.661) and P-value was (0.551), (II) lumbar flexion &extension ROM where the t-values were (0.61, 0.46) and P-values were (0.551, 0.649) respectively, and lumbar Rt & Lt side bending ROM where t-values were (018, 82) and P-values were (0.1000, 0.423) respectively, and finally, (III) functional disability where the t-value was (0.94) and P-value was (0.361) as shown in table (2).

Post treatment there was a significant differences between group (A) and (B) in: (I) pain intensity level where the t-value was (3.26) and P-value was (0.004), (II) lumbar flexion and extension ROM where the t-values were (3.68, 4.94) and P-values were (0.002, 0.000) respectively, and lumbar Rt & Lt side bending ROM where t-values were (2.01, 3.11) and P-values were (0.05, 0.006) respectively, and finally, (III) functional disability where the t-value was (3.04) and P-value was (0.007) as shown in table (2).

Table (1): Paired t-test of the dependant variables in each group.

Group	Variable	Pre treatment	Post treatment	Paired t-test		
		Mean ±SD	Mean ±SD	t-value	P-value	Significance
Group (A)	Pain level	8.00 ± 2	6.9±1.8	4.86	0.0001	S
	Lumbar flexion ROM	27.19± 12.68	29.06±12.89	1.67	0.11	NS
	Lumbar extension ROM	7.18±2.42	8.56±2.80	2.74	0.001	S
	Lumbar RT side bending ROM	5.93± 4.74	7.68±4.28	3.15	0.005	S
	Lumbar LT side bending ROM	5.31±3.73	7.5±3.06	3.2	0.005	S
	Functional disability	50.47±17.8	40.87±11.52	4.64	0.0001	S
Group (B)	Pain level	8.31± 1.59	5.36±1.56	7.15	0.0001	S
	Lumbar flexion ROM	27.89± 12.7	41.05±8.36	4.77	0.003	S
	Lumbar extension ROM	7.89±3.74	15.78±6.74	8.72	0.001	S
	Lumbar RT side bending ROM	6.57±3.64	10.52±3.58	7.68	0.002	S
	Lumbar LT side bending ROM	6.89±3.68	11.05±4.16	5.63	0.004	S
	Functional	55±10.07	33.57±11	9.04	0.0001	S

P-value = Probability S = Significance NS = Non significance

Table (2): Paired t-test of the dependant variables for both groups.

Time of measurements	Variable	Group (A)	Group (B)	Paired t-test		
		Mean ±SD	Mean ±SD	t-value	P-value	Significance
Pre treatment	Pain level	8.00 ± 2	8.31± 1.59	0.661	0.551	NS
	Lumbar flexion ROM	27.19±12.86	27.89±12.7	0.61	0.551	NS
	Lumbar extension ROM	7.18±2.42	7.89±3.74	0.46	0.649	NS
	Lumbar RT side bending ROM	5.93± 4.74	6.57± 3.64	0.18	0.1000	NS
	Lumbar LT side bending ROM	5.31±3.73	6.89± 3.68	0.82	0.423	NS
	Functional disability	50.47±17.8	55±10.07	0.94	0.361	NS
Post treatment	Pain level	6.9±1.8	5.36±1.56	3.26	0.004	S
	Lumbar flexion ROM	29.06±12.89	41.05±8.36	3.68	0.002	S
	Lumbar extension ROM	8.56±2.8	15.78±6.74	4.94	0.00	S
	Lumbar RT side bending ROM	7.68±4.22	10.52±3.58	2.01	0.05	S
	Lumbar LT side bending ROM	7.5±3.06	11.05±4.16	3.11	0.006	S
	Functional disability	40.87±11.52	33.57±11	3.04	0.007	S

P-value = Probability S = Significance NS = Non significance

DISCUSSION

I. Pain intensity level: both MFR and CG groups revealed a statistical significant reduction in pain intensity level after the intervention period in patient with CLBP. Manual therapy may have an effect on spinal cord[5] and has been associated with hypoalgesia[23]. The hypoalgesia results from segmental postsynaptic inhibition on dorsal horn pain pathway neuron during manual therapy. The analgesic effect of MFR could be explained by both spinal and supraspinal mechanisms; Activation of both muscle and joint mechanoreceptors occurs during sustained release. This leads to sympatho-excitation evoked by somatic efferents and localized activation of the periaqueductal grey that plays a role in descending modulation of pain[25,28,33]. Nociceptive inhibition then occurs at the dorsal horn of the spinal cord, as simultaneous gating takes place of nociceptive impulses in the dorsal horn, due to mechanoreceptor stimulation[15]. Myofascial barriers may have mechanical, circulatory and neural effects on the patients in both acute and chronic conditions. 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[16]. The result of the current study was supported by Cisler 1997[8], who studied the possible use of myofascial release in whiplash injuries. Another conducted study supports the current findings about female runners who had extremely chronic hamstring pain and deficit in flexibility in leg and revealed a significant reduction in pain after MFR intervention. MFR stimulates joint proprioceptors, via stretching of a joint capsule, may be capable of reducing pain by inhibiting the smaller diameter nociceptive neuronal input at the spinal cord level[18]. This is supported by the study of Degenhard et al. (2007)[10], who reported that concentrations of several circulatory pain biomarkers (including endocannabinoids and endorphins) were altered following osteopathic manipulative treatment incorporating muscle energy. Moreover myofascial trigger point deactivation was shown to be enhanced by use of different forms of MFR.II.

II. Lumbar spine range of motion (ROM): MFR group showed a statistical significant improvement in lumbar spine ROM after the intervention period in patient with CLBP. The improvement in ROM can be explained by reduction of pain and a proposed hypothesis by Hong 1999[19]. The viscoelastic explanation for the palpable changes associated with fascial release enjoys widespread support. According to this theory, fascia responds to the mechanical interventions of therapy in three related ways.1. The ground substance changes its volume and consistency, 2. The cross-

linkages between the fibers are broken, and 3. The inter fiber distance is increased so that fiber affinity is reduced, resulting in increased extensibility in the tissue[27].

The reduction in tissue tension during manual therapy has been attributed to several factors. One factor is the decrease in gamma gain and efferent gain from the central nervous system, resulting in a relaxation and elongation of muscle fibers. Another factor is the change of elastic resistance to viscous compliance due to morphologic changes. There is an apparent relaxation of these elastic fibers. Tissue tension release occurs simultaneously with a perception of increased fluid throughout the tissues, and a sense of increased energy throughout those tissues treated. During the treatment technique, heat is emanated from those body tissues; there is a sensation of movement, filling of space, and often a therapeutic pulse. This therapeutic pulse occurs frequently during Manual Therapy techniques. The amplitude or force of this therapeutic pulse increases during the treatment technique and subsides as the correction of the neuromusculoskeletal tissue is completed[29]. Another theoretical explanation conducted by Greenman, 2003[17], who discussed the idea of creep in reference to changing the structure of the fascia. This example of creep is similar to the effects of myofascial release on fascia. During the process of stretching the fascia, heat is given off from the deforming tissue, resulting in an energy loss that is never regained from the fascia[3].

This term is called hysteresis and is used therapeutically in myofascial release in order to gain the desired results[17]. Under ideal conditions the fascial ground substance should have a gelatinous consistency to absorb the compressive forces of movement or trauma. So When true myofascial release is applied, cross restrictions are released and the ground substance also seem to change, allowing for substantial and lasting improvement, Due to the thermal, mechanical and bioelectric energies are applied to a colloid, which makes up the fascial ground substance. The colloid changes from a solid to a gel quite quickly[32].

III. Functional Disability: MFR revealed a statistical significant reduction in Function disability level after the intervention period in patient with CLBP. This improvement is the resultant of combined findings of pain reduction and increasing of lumbar spine mobility.

Conclusion

The findings of this study are looking forward to see MFR as an integral part of specific manual techniques directed at the low back muscles dysfunction. MFR are effective in reducing pain and functional disability and improving lumbar spine mobility in patients with CLBP.

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الملخص العربي

فاعلية تقنية العلاج اليدوي في صورة الانفراج العضلي الليفي في التحكم في المرضى المصابين بآلام أسفل الظهر المزمن

مقدمة : يعرف ألم أسفل الظهر بأنه الأكثر كلفة من الناحية الاقتصادية على مستوى العالم . تتراوح نسبة الإصابة به بين ٥٠ % - ٨٠% بين البالغين . كما تبلغ نسبة عودة الألم بعد الشفاء منه ما بين ٥٠ % - ٨٨% . تتعدد وسائل العلاج الطبيعي المستخدمة في علاج ألم أسفل الظهر إلا أنه بدأ التركيز في الآونة الأخيرة على استخدام العلاج اليدوي الإستيوباثي في صورة تقنية الانفراج العضلي الليفي للتحكم والسيطرة على هذا النوع من الألم . **الهدف :** تهدف هذه الدراسة إلى تقييم فاعلية تقنية الانفراج العضلي الليفي في التحكم والسيطرة على آلام أسفل الظهر المزمن . **الطريقة :** تم إجراء هذا البحث على أربعين مريضا (رجال – نساء) تتراوح أعمارهم بين ٣٠ – ٥٥ عام ويعانون من آلام أسفل الظهر لمدة تزيد عن ثلاثة أشهر . تم تقسيم المرضى عشوائياً إلى مجموعتين متساويتين في العدد حيث تم علاج المجموعة الأولى بواسطة برنامج علاج طبيعي خاص يشتمل على أشعة تحت الحمراء ، موجات فوق صوتية ، ذبذبات كهربائية وتمرينات علاجية والثانية بنفس البرنامج بالإضافة إلى تقنية الإنفراج العضلي الليفي ٣ مرات لمدة ٤ أسابيع لمدة ١٢ جلسة . **النتائج :** أظهرت النتائج فروق ذات دلالة معنوية إحصائية بين المجموعتين تشير إلى تفوق تقنية الانفراج العضلي الليفي في السيطرة والتحكم في المتغيرات موضع الدراسة وهي شدة الألم والمدى الحركي للفقرات القطنية وكذلك مقياس أوسوستري للعجز الوظيفي قبل وبعد العلاج . **الخلاصة :** تقنية الانفراج العضلي الليفي لها تأثير في التحكم والسيطرة على آلام أسفل الظهر المزمن .

الكلمات الدالة : تقنية الانفراج العضلي الليفي – آلام أسفل الظهر المزمن .