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Effect of Myofascial Release on Erector Spinae Muscle in Mechanical Low Back Pain

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Abstract

Background: The prevalence rates of mechanical lower back pain is higher in the Indian population compared to global and other ethnic populations. It affects a large proportion of the population, especially women and elementary workers.

Objective of the study: To determine the effectiveness of myofascial release therapy in women of age group 30- 50 suffering from mechanical low back pain for less than 12 months and to generate clinical evidence for myofascial release.

METHOD: Simple random sampling of the target population was done for a sample size of 40. Women included in the study were exposed to myofascial release treatment for 3 times a week for 3 weeks. It was three- step procedure: hot moist pack (HMP) (10-15 mins), MFR (10 mins on each side) followed by Icing (5-7 mins). Pre-test and post-test data were collected for the intensity of pain, range of motion, and manual muscle stretching.

RESULTS: Statistical analysis showed that the 30- 45 years age group women with an average BMI 28 showed significant improvement in reduction of pain and range of motion compared to age group 45.1- 50 years (BMI- 30.5). Muscle stretching power was also significantly improved for 30- 40 years age group women.

CONCLUSION: Myofascial release therapy is an effective technique to alleviate primary symptoms of pain, improve muscle endurance and reduce movement restriction in patients with normal and overweight BMI. However, improvement in older women with an obese BMI range was not found statistically significant during 3- week therapy program.

Key words: Mechanical low back pain, Myofascial release therapy, visual analog scale, range of motion, and Manual Muscle testing

1. INTRODUCTION

About two-thirds of adults, both men and women have low back pain (LBP) at some point in their lives[1]. Housewives and other moderate workers in the 30–50 age range frequently experience back pain. The posterior trunk ache between the ribs and the gluteal folds is known as mechanical low back pain[1, 2]. It primarily arises from the intervertebral disks, spine, or soft tissues nearby and is influenced by a variety of anthropometric, muscular, physical, and postural factors[3]. Mechanical LBP is linked to significant etiological factors such as obesity, muscular imbalance, and limited lumbar range of motion (ROM). Lower back pain and tightness are also caused by erector spinae muscle weakness[4].

Reduced lumber mobility may be caused by facial contraction or muscle failure[5]. The most common cause is back sprains and strains brought on by poor or stagnant posture[6]. Various forms of therapy are used by several professional groups in the management of LBP such as medication, machine-based physiotherapy, yoga etc. Nonsteroidal anti-inflammatory medications, opioids, and topiramate are found effective in short-term management of mechanical low back pain[7]. Exercise, mobilization, and manipulation are a few non-pharmacological and non-invasive techniques commonly used to treat LBP[8]. Myofascial release technique (MFR) is another cheap and effective technique to treat and manage mechanical lower back pain. It is more effective when strength of deep muscles (the transverse abdominis and multifidus) is decreased and it resulted in increased activation in the superficial muscles (such as the erector spinae) in patients with LBP [9, 10]. Consequently, increased activation of erector spinae can affect the tensegrity of the fascia along superficial backline in individuals with LBP. Myofascial release (MFR) methods and techniques concentrate on releasing these mobility limitations that develop in the body's soft tissues as a result of fascial stiffness[6, 11]. In order to restore the fluid/lubricative quality of the fascial tissue, the mobility of the tissue, and normal joint function, regulated and focused force that is applied in a specific direction acts to

stretch or elongate the muscular and fascial (myofascial) structures. It enhances the local blood flow, stimulates lymphatic system and increases the flexibility and range of motion (ROM) in tight, stiff, or overworked muscles[1, 12]. Although there are various treatment guidelines available regarding the evaluation, treatment, and management of LBP, In the present study we aimed to investigate the effect of myofascial release therapy along with HMP and icing on pain and lumbar flexion range of motion in mechanical LBP among housewives.

2. MATERIAL AND METHODS

2.1 Study Design

This study is based on a simple random sampling of subjects. It was conducted in the Department of Physiotherapy, Krishna Hospital, Karad, India. Institutional ethics committee approval was taken prior to the commencement of the study. The purpose of the study was conveyed to the subjects and Informed consent was taken from all the subjects included in the study. A total of 40 female, housewives, in the age group of 30 to 50 years, diagnosed with acute mechanical low back pain for less than 12 months were selected for the study. Out of 40, 5 patients were excluded from the study because of having any one/ more of the complications like spinal deformities like scoliosis, traumatic fractures, prolapsed intervertebral disc, congenital disorder, infections like Koch's spine, surgery related to spine, inflammatory conditions like ankylosis spondylitis, or any other neurological disorder.

2.2 STUDY PROCEDURE

The evaluation comprised of demographic details, medical history, duration of back pain assessment, and objective assessments like Pre-test of Visual analog scale (VOS), Manual Muscle testing (MMT) and Range of Motion (ROM) was assessed before the start of treatment. Myofascial release treatment was done 3 times a week for 3 weeks and a post-test was conducted after the completion of treatment. Total treatment time per session was 30-40 mins, divided into hot moist pack (HMP) (10-15 mins), MFR (10 mins each side) followed by Icing (5-7 mins)

2.2.1 Pain measurement: Pain perception was assessed on the visual analog scale (VOS). It is a straight horizontal fixed length, 10-point scale. The ends are defined as the extreme limits of the pain to be

measured. Subjects were asked to mark their pain level with 10 representing the worst imaginable pains and 0 representing no pain.

2.2.2 Manual Muscle testing: Endurance of back extensor muscles (intrinsic back muscles) was tested before and after the myofascial release treatment. Patients were asked to lay down on bed and raise their heads, shoulders, and chest off the bed as high as they can. The activity was graded on 5 point scale: Grade 5 (Normal) and Grade 4 (Good) to grade 1 (worst).

2.2.3 Range of Motion measurement: The flexion and extension range of motion evaluation of the lumbar spine was made using a simple goniometer after instructing the subjects regarding positioning and the accurate way of performing the test.

The participants stood straight at the start of the test with their arms out in front of them and their knees fully extended. Following a verbal instruction from the examiner, participants performed slow, gradual flexion and extension movements until they reached the maximum amplitude, at which point the goniometer measurement was taken. The arms needed to be 90 degrees flexed to measure lumbar flexion, and they needed to be fixed behind the neck to measure lumbar extension. The iliac crest was employed as the fixed reference point for these measurements, and the axillary line anterior to the iliac crest was used as the mobile point, ensuring that the fixed arm of the goniometer remained centered in the lateral region[1].

2.2.4 Myofascial release: Light pressure was applied to the supporting structure using the crossed-hand technique, and enough traction was maintained to retain the tissue at its limit of motion. Traction is kept for at least 90 to 120 seconds before being slowly and gently ended when the tissue starts to soften and extend. Myofascial release was done on both sides with the same degree of pressure[3].

2.2.5 Statistical analysis: Mean, standard deviation and Student t- test was measured using SPSS software to assess the difference between pre-test and post-test data for pain management range of motion and muscle strength. The level of significance was taken as 5% i.e.: $p > 0.05$ is not significant and $p < 0.05$ indicates significant

Results

A total of 35 women subjects, working as housewives as the occupation were included in the study. They were categorised in 30- 35 yrs, 35.1- 40 yrs, 40.1- 45 yrs and 45.1- 50 age groups. Women of three age groups, 30- 45 yrs were weighted as overweight according to their BMI. Women of age group 45.1- 50 yrs were categorized as obese. The parity of all age group ranged between- 1.0- 2.0 (Table 1).

The pain was measured during rest and during activity on VOS. Pre-test data showed that more pain was experienced during the activity compared to resting conditions by all age group of women. Comparatively more pain was experienced by 40- 50 age group women than 30- 40 age group women. Statistically significant reduction in pain was noticed after HPT, Myofascial release, and icing in all age groups women except 45.1- 50 years age group (Table 2).

The range of motions was measured before and after the three-step therapy. Significant improvement in the range of flexion and extension was noticed in pre- test and post- test measurement among women of age group 30- 45 years. Improvement (not statistically significant) was also noticed among 45.1- 50 age group women with higher BMI (Table 3).

Changes in muscle strength were measured manually by comparing pre-test and post- test data. A significant change in the strength of flexors and extensors was noticed in 30- 40 years age group women. The therapy was not found statistically significantly effective in 40.1- 50 years age group women (Table 4).

Table 1. Demographic data of housewives

	Age groups			
	30-35	35.1-40	40.1-45	45.1-50
Number of women	8	8	10	9
BMI (Avg)	28.5	28	27.5	31.0
Parity (Avg)	1.0	1.5	2.0	1.5

Table 2. Measurement of Pain

Age group		Pre-test (Mean± SD)	Post-test (Mean± SD)	Paired 't' test*
30- 35	Rest	55 ± 6	40 ± 4	$p < 0.05$
	Activity	71 ± 9	49 ± 5	$p < 0.05$
35.1- 40	Rest	58 ± 10	44 ± 6	$p < 0.05$
	Activity	74 ± 12	56 ± 8	$p < 0.05$
40.1-45	Rest	76 ± 9	50 ± 4	$p < 0.05$
	Activity	84 ± 4	65 ± 4	$p < 0.05$
45.1-50	Rest	79 ± 6	70 ± 4	$p > 0.05$
	Activity	89 ± 7	77 ± 4	$p > 0.05$

Table 3. Range of motions before and after therapy.

Age group	Range of Motions	Pre-test Mean± SD	Post-test Mean ± SD	Paired 't' test*
30- 35	Change in Flexion	41 ± 10	56 ± 7	$p < 0.05$
	Change in Extension	51 ± 4	69 ± 8	$p < 0.05$
35.1- 40	Change in Flexion	44 ± 12	60 ± 7	$p < 0.05$
	Change in Extension	48 ± 8	62 ± 6	$p < 0.05$
40.1-45	Change in Flexion	44 ± 11	55 ± 10	$p < 0.05$
	Change in Extension	53 ± 6	58 ± 5	$p < 0.05$
45.1-50	Change in Flexion	52 ± 5	56 ± 7	$p > 0.05$
	Change in Extension	55 ± 3	58 ± 8	$p > 0.05$

Table 4: Comparison of changes in muscle strength before and after the therapy

Age group	Manual muscle strength	Pre-test Mean± SD	Post-test Mean± SD	Paired 't' test*
30- 35	Change in Flexors	35 ± 3	43 ± 6	$p < 0.05$
	Change in Extensors	32 ± 3	44 ± 3	$p < 0.05$
35.1- 40	Change in Flexors	30 ± 8	47 ± 6	$p < 0.05$
	Change in Extensors	31 ± 5	44 ± 9	$p < 0.05$
40.1-45	Change in Flexors	23 ± 7	30 ± 3	$p > 0.05$
	Change in Extensors	26 ± 4	31 ± 6	$p > 0.05$
45.1-50	Change in Flexors	20 ± 7	29 ± 6	$p > 0.05$
	Change in Extensors	22 ± 3	26 ± 3	$p > 0.05$

Discussion

The outcome of the present study shows that myofascial therapy is more effective in younger patients with lower BMI. Perception of pain was reduced after therapy during resting as well as during activity. According to the gate control theory, sensory stimuli—like the pressure given in myofascial release—travel down nervous system pathways more quickly than pain sensations do[13, 14]. Faster-moving pressure stimuli block the transmission of painful stimuli to the brain, and shut down the sense of pain in the brain. Additionally, it was observed that patients in older and obese women showed a lesser decrease in pain during the 3 weeks of therapy. It has been found by Ibrahimi-Kacuri et al (2015) that obesity and age have no direct influence on back pain, but they could prolong the healing process[15]. Obesity and higher muscular mass results in slower reduction in pain and a requirement of a large recovery period[16, 17] (Atchison & Vincent 2012; Brumitt & Cuddeford 2015).

It was found in the present study that extensors showed comparatively more improvement in muscle strength for 30- 40 age group women compared to 40- 50 age group women. It might be because as women get older, she lose a small amount of flexibility as a process of aging[18, 19]. Myofascial release therapy helped in increasing blood flow in muscles, enhancing the dysfunctional condition and mobility of soft tissues.

Myofascial release therapy breaks adhesions formed by matrix of the scar tissue[20, 21]. This therapy helps in the dissolution of limiting intermolecular cross-links, reorganization of internal fluids, and extension of collagenous tissue. Additionally, it aids in enhancing vascular and lymphatic circulation, it helped to increase soft tissue extensibility which improved the range of motion and thus muscle strength[22, 23]. Many randomized studies performed on low back pain showed that participants reported a reduction in pain and improvement in trunk flexion performance by myofascial release therapy [24, 25].

Conclusion

Myofascial release therapy is effective to regain lost range of motion and muscle endurance, as well as lessening the pain and discomfort in a short period of three weeks among women. However, its effect is statistically not significant in older women with an obese BMI range.

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