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Original Research Article

ADDED EFFECT OF MUSCLE ENERGY TECHNIQUE FOR IMPROVING FUNCTIONAL ABILITY IN PATIENTS WITH CHRONIC NONSPECIFIC LOW BACK PAIN

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ABSTRACT

Background and Purpose: Low back pain is a considerable health problem in all developed countries and is most commonly treated in primary healthcare settings.

Improving functional performance in patients with chronic low back pain is of primary importance. The purpose of this study was to examine the effects of Muscle Energy Technique (MET) along with supervised exercises, hot pack and TENS to improve functional performance in subjects with chronic nonspecific low back pain.

Methods and Measures: 30 subjects, including both males and females diagnosed with chronic nonspecific low back pain were randomly assigned into 2 treatment groups. Patients were selected according to inclusion criteria and positive muscle length tests of Quadratus Lumborum, Erector Spinae, Iliopsoas and Tensor Fascia Latae. The control group received supervised exercises, hot pack and TENS while the experimental group received the same exercises along with MET. Both groups received the selected treatment 9 sessions over a 3-week period (3 sessions per week). Patients completed an Oswestry Disability Index on their first and ninth treatment session and the scores were calculated.

Results: Paired t test was used to analyse the ODI within the group. Unpaired t-test was used for between the analyses of ODI for both the control and experimental groups. A 2-tailed p value (P- 0.0006) demonstrated a statistically significant difference, with the experimental group showing greater improvement in the Oswestry Disability Index score than the control group.

Conclusion: MET has got added beneficial effect for decreasing disability and improving function in patients with chronic nonspecific low back pain along with supervised exercises, hot pack and TENS.

KEY WORDS: Muscle Energy Technique (MET), Nonspecific Low Back Pain, ODI (Oswestry Disability Index), Exercises.

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INTRODUCTION

Low back pain is usually defined as pain, muscle tension, or stiffness localised below the costal margin and above the inferior gluteal folds, with or without leg pain [1].The lifetime prevalence of low back pain is reported to be as high as 84%, and the prevalence of chronic low back pain is about 23%, with 11-12% of the population being disabled by low back pain [2].

LBP may be classified as mechanical, non-mechanical, and psychogenic. Mechanical LBP may be specific or nonspecific. According to its

duration, LBP may be acute (sudden onset and lasting less than six weeks), subacute (lasting 6 to 12 weeks), chronic (lasting longer than 12 weeks), and recurrent (reappears after lull periods). Mechanical - or nonspecific - LBP is the most commonly reported by the population. The human body has a centre of gravity, which keeps the balance between muscles and bones to maintain the integrity of structures and protect them against injury, in any position - standing, sitting or lying down. In nonspecific LBP, imbalance typically occurs between the functional load - which is the effort required for work and activities of daily living, and ability - which is the potential for performing these activities. Nonspecific LBP is characterized by the absence of structural change; that is, there is no disc space reduction, nerve root compression, bone or joint injuries, marked scoliosis or lordosis that may lead to back pain.

Despite the lack of structural change in nonspecific LBP, it can limit daily activities and cause temporary or permanent inability to work. The incidence of nonspecific LBP is higher in workers subjected to heavy physical exertion, such as weight lifting, repetitive movements, and frequent static postures. Nonspecific LBP is caused by postural deviations. The characteristics of nonspecific LBP are heavy pain, worsening with exertion especially in the afternoon, relieved with rest, absence of neurological and muscle contraction, and antalgic posture, associated with inactivity and poor posture [3].

Muscle Energy Techniques are a class of osteopathic soft tissue manipulation methods that incorporate precisely directed and controlled patient initiated, isometric and/or isotonic contractions, designed to improve musculoskeletal function and reduce pain. MET can be used to lengthen and strengthen muscles, to increase fluid mechanics and decrease local oedema, and to mobilize a restricted articulation [4]. MET is an active technique, in that the patient, instead of the care provider, supplies the corrective force. Greenman defined MET as a ‘‘manual medicine treatment procedure that involves the voluntary contraction of patient muscle in a precisely controlled direction, at varying levels of intensity, against a distinctly executed counter-force applied by the operator” [5]. Literature has shown the support of MET for acute low back pain for improving functional ability when used with supervised neuromuscular re-education and resistance exercise training. There is dearth in the literature regarding the effect of MET as an isolated treatment on nonspecific low back pain. It is therefore useful to explore the effectiveness of treatments that may assist people with LBP, particularly those treatments such as MET which are non-invasive and are likely to be safe and inexpensive [6]. The aim is to study the added effect of Muscle Energy Technique in patients having Chronic Nonspecific Low Back Pain for improving functional ability with the hypothesis that there is a good effect of MET in decreasing disability and improving functional ability.

MATERIALS AND METHODS

Sample: 30 males and females were recruited for the study on the basis of low back pain experiencing pain localized para-spinally of more than 12 weeks of duration (chronic) and having no radiating pain, no lumbar disc herniation, spinal deformities and ODI score between 20-60%. Each subject signed an informed consent and all the subjects were randomly assigned in two groups where subjects in control group undergone only supervised exercises treatment protocol and experimental group was treated with MET along with supervised exercises treatment. Outcome was measured on first day and then after 3 weeks (3 sessions per week) after the treatment from each subjects by Oswestry Disability Index questionnaire (ODI). The subjects were tested for tightness of four muscles; Quadratus Lumborum, Erector Spinae, Iliopsoas and Tensor Fascia Latae, and MET accordingly along with exercises therapy as the protocol.

Supervised exercises treatment protocol: Hot pack for 10mins, 2-channel TENS for 10mins, static abdominals (10 repetitions -10 seconds hold each), static back extensors (10 repetitions -10seconds hold each), static glutei (10 repetitions -10seconds hold each), pelvic bridging (10 repetitions- 5seconds hold each), pelvic rolling (5 repetitions each side- 5 seconds hold each), Cat-Camel (5 repetitions each - 5seconds hold each), Superman (5 repetitions each side-seconds

hold each) as the protocol [7].

Testing of the muscles and application of Muscle Energy Technique: MET was applied in four different muscles; Quadratus Lumborum, Erector Spinae, Iliopsoas and Tensor Fascia Latae (TFL). For each muscle after positioning the patient was asked to apply 20% force against therapist force and hold that contraction for 7-10 seconds and after that relax for 5 seconds and when patient exhale, therapist takes muscle to new restriction barrier. Hold this position for 30 seconds at the end barrier as an end-stretch with 3 repetitions.

Quadratus Lumborum (QL)

Testing of Quadratus Lumborum: The patient stands against a wall with feet shoulder-width apart, a pure side-bending is requested, so that the patient runs a hand down lateral thigh/calf. Normal level of side-bending excursion allows the fingertips to reach just below the knee. Both sides are assessed. If the side-bending to one side is limited, then quadratus on the opposite side is tight/short [4].

Technique applied for tight Quadratus Lumborum: 'Banana' position

The patient lies supine with the feet crossed (the side to be treated crossed under the non-treated side leg) at the ankle. The patient is arranged in a light side-bend, away from the side to be treated, so that the pelvis is towards that side, and the feet and head away from that side (banana shaped). As this side-bend is achieved, the barrier is correctly identified. The patient's heels are placed just off the side of the table, anchoring the lower extremities and pelvis. The therapist, standing on the side opposite that to be treated, slides her cephalad hand under the patient's shoulders to grasp the treated-side axilla and the caudal hand is placed firmly on the anterior superior iliac spine of that side. The patient is instructed to side-bend towards the treated side producing an isometric contraction in QL on that side. After 7 seconds the patient is asked to completely relax. The therapist side-bends the patient to the next barrier till end barrier is achieved. The end stretch is held for 30 seconds allowing a lengthening of shortened musculature [4].

Erector Spinae:

Testing of Lumbar Erector Spinae: Patient sits at the end of the couch and is asked to roll their chin down to chest and continue flexing down vertebrae by vertebrae. Therapist palpates the top of the iliac crest and posterior superior iliac spine with their thumb and when they feel muscular tension increase to their hand, test is complete. Measurement of more than 15cm or 8inch from forehead to top of the knee indicates a tight lumbar erector [4].

Technique applied for tight Lumbar Erector Spinae:

Patient is in prone-lying position with pillow under abdomen. Therapist places his left hand on lower thoracic spine and right hand on sacrum (cross hand position). Patient is asked to lift their shoulders off the couch to contract the lumbar erector spinae. Hold for 7 seconds and on relaxation, therapist takes his left hand into cephalic position and right into caudal. (encouraging lengthening of erector spinae) [4].

Iliopsoas:

Testing of Iliopsoas (Kendall test): The patient lies supine with the knees bent over the end or edge of the examining table. The patient flexes one knee onto the chest and holds it. The angle of the test knee should remain at 90° when the opposite knee is flexed to the chest. If it does not, tightness is present [8].

Technique applied for tight Iliopsoas: The patient is asked to lie on his back on the edge of the couch by holding onto their left knee against his chest. (same position as the test). The therapist now stabilises patient's right hip by right hand and placing left hand just above the patient's right knee. The patient is asked to flex the hip against the resistance for 10 seconds. On relaxation, therapist slowly applies a downward pressure [4].

Tensor Fascia Latae (TFL):

Testing of Tensor Fascia Latae (Ober's Test): The patient is in the side-lying position with the lower leg flexed at the hip and knee for stability. The therapist then passively abducts and extends the patient's upper leg with the knee flexed to 90°. The therapist slowly lowers the

upper limb; if tightness is present, the leg remains abducted and does not fall to the table [8].

Technique for tight Tensor Fascia Latae: The patient is in supine lying position. The therapist stands on the non-tested leg side of the patient. Therapist crosses the patient's non-tested leg over the leg to be treated, such that the foot of the non-tested leg remains in contact with the couch. The therapist controls the patient's non-tested knee with his right hand and holds onto the patient's ankle of the leg to be treated. The leg is then placed into an adducted position until a bind is felt. From this position, patient is asked to abduct the leg against the resistance applied. After 10seconds, the patient is told to relax and the therapist takes the patient's leg further into adduction [4].

RESULT

Pre-post intervention analysis was done using paired t-test in both control and experimental groups, which showed that there was significant improvement in the post intervention ODI score in both the groups. Comparison of mean differences of ODI score between the control and experimental groups was done by using unpaired t-test, which showed that there is significant improvement in the mean difference of the ODI score of experimental group (26.16) than the control group (15.867).

	Experimental Group			Control Group		
	Pre ODI (mean)	Post ODI (mean)	Difference (mean)	Pre ODI (mean)	Post ODI (mean)	Difference (mean
Mean	36.487	10.173	26.16	30.3	14.433	15.867
Standard Deviation	6.972	2.892	5.297	8.436	4.896	7.33
P value	< 0.0001 - Extremely Significant (paired t-test)			< 0.0001 - Extremely Significant (paired t-test)		
	0.0006 - Extremely Significant (unpaired t-test)					

Table 1: Showing Mean, SD, p-value of experimental and control groups.

DISCUSSION

The current study was undertaken to assess the effectiveness of MET in patients with chronic nonspecific low back pain. For the purpose of this study, 30 patients were taken and divided into 2 groups. Control group was given supervised exercises, hot pack and TENS while the experimental group was given same exercises and MET. The data from this study suggest that there is added effect of MET for treating patients with chronic nonspecific low back pain along with supervised exercises, hot pack and TENS. The changes observed in this study are noteworthy, within the group comparison showed that there was significant improvement in the disability post intervention in both the groups. In this study, the mean posttreatment Oswestry score was 10% for patients in the experimental group compared to 14.4% in the control group. It should be noted that the control group's supervised exercises intervention produced good outcomes, but the addition of the MET improved the outcomes substantially.

The reduction in pain due to MET can be explained on the basis of its neurophysiology, as described by Chaitow that Post-isometric relaxation (PIR) refers to: the subsequent reduction in tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors called Golgi tendon organ that are located in the tendon of the agonist muscle. These receptors react to overstretching of the muscle by inhibiting further muscle contraction. In more technical terms, a strong muscle contraction against equal counterforce triggers the Golgi tendon organ. The afferent nerve impulse from the Golgi tendon organ enters the dorsal root of the spinal cord and meets with an inhibitory motor neuron [4]. Lewit confirmed this observation that the increased tension of the affected muscles and the resulting pain and dysfunction are both relieved by restoring the full stretch length of the muscle [9].

The effect of MET on disability was supported in a study by Capt. Eric Wilson where he did a pilot clinical trial, examining the outcomes of Muscle Energy Technique (MET) in patients with acute low back pain. He reported that MET combined with supervised motor control and resistance exercises may be superior to neuromuscular cular re-education and resistance training

for decreasing disability and improving function in patients with acute low back pain [10]. Noelle M.Selkow et al did a pilot study on Short-Term Effect of Muscle Energy Technique on Pain in Individuals with Non-Specific Lumbopelvic Pain which showed that subjects receiving MET demonstrated a decrease in VAS worst pain over the past 24 hours, thereby suggesting that MET may be useful to decrease Lumbopelvic pain over 24 hours [11]. Patil Prachi et al also concluded the efficacy of MET in reducing disability. It stated that MET on quadratus lumborum combined with interferential therapy is more effective in reduction in disability and increasing spinal range of motion than interferential therapy alone in patients with acute low back pain [12]. Deepali Sharma and Siddhartha Sen studied the effects of Muscle Energy Technique on pain and disability in subjects with SI joint dysfunction. They concluded that MET and mobilisation are both effective in treating chronic low back pain due to sacroiliac joint dysfunction [13].

Shiby Varghese studied the effectiveness of Muscle Energy Technique as compared to manipulation therapy in chronic low back pain, and concluded that Muscle Energy Technique is as effective as Manipulation in the treatment of low back pain [14].

CONCLUSION

Results from this study suggest that MET has got added beneficial effect for decreasing disability and improving function in patients with chronic nonspecific low back pain along with supervised exercises, hot pack and TENS. The subjects who were exposed to MET along with exercises therapy recovered to a greater extent as those treated with exercises alone. The MET and the exercises were operationally defined to allow the intervention to be easily reproduced in the clinical setting. Limitations of the study was the patients activity of daily routine was not recorded which may have caused or aggravated their low back pain during the treatment interval included in this study were limited to those referred to a single outpatient clinic and not multi-regional centres. Further research can be done with large sample size and follow up of the patients can be implemented in order to see the long-term effect of MET post study.

ABBREVIATIONS

MET - Muscle Energy Technique
LBP - Low Back Pain
ODI - Oswestry Disability Index
VAS - Visual Analogue Scale
TENS - Transcutaneous Electrical Nerve Stimulation
QL - Quadratus Lumborum
TFL - Tensor Fascia Latae

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Conflicts of interest: None

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