

To study the effect of Muscle Energy Technique on Erector Spinae muscle on Pain, Functional disability & Lumbar Range of motion in person's with Mechanical back pain – An Experimental study

¹Kairavi Trivedi & ²Dr. T. Kanna Amarnath

¹Assistant Professor, Apollo Institute of Physiotherapy, Ahmedabad, Gujarat (India)

²Senior Lecturer, Apollo Institute of Physiotherapy, Ahmedabad, Gujarat (India)

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*Corresponding Author

Email: kairavitrivedi[at]gmail.com

ABSTRACT

Back ground: Low back pain is leading cause of activity limitation and work absence throughout much of the world, and it causes an enormous economic burden on individuals, families, communities, industry and governments. At present, there is high prevalence of low back pain (40.7%) in subjects aged 20 years and above. Most cases (90%) are nonspecific and occur in all age groups.

Aim: The Aim of this study is to Study the Effect of Muscle Energy Technique on Erector Spinae muscle on Pain, Functional disability and Lumbar Range of motion in person's with Mechanical back pain.

Materials and method: 46 patients were taken for the study that fulfills the inclusion criteria. Assessments and outcome measures were taken for those patients. They were randomly divided into two groups for the study. Group A received muscle energy technique and conservative exercises for back while other group received only conservative exercises for back 4 days per week till 2 weeks. Total 8 treatment sessions given to both the groups. A post assessment and measurement of outcome measures like VAS, modified Oswestry disability questionnaire and lumbar range of motion were taken on 1st day and after 8th day of study duration.

Results: The results were analyzed by Wilcoxon Signed Rank Test for intra-group analysis to check effect in pre and post intervention. Mann – Whitney U Test was used for inter- group analysis to check effectiveness between the group A (31±5.59) and group B(30.47±5.96). In inter group analysis between both the groups shows p value less than 0.05 that is significant improvement on pain, functional disability and lumbar rom. In Intra- group analysis, lysis Muscle Energy Technique and conservative therapy showed more effectiveness in reducing Pain, and Functional Disabilities (p<0.05) but no effect on Lumbar Range of motion.

Conclusion: In Mechanical back pain, common Conservative therapy given along with Muscle Energy Technique to Erector Spinae muscle give Positive effect in reducing Pain and Functional Disability while No significant improvement in Lumbar Range Of Motion. Muscle energy techniques can be used as a new adjunct to Mechanical back pain.

1. Introduction

According to Hoy D. Et. Al. low back pain is documented as an extremely common health problem leading to work absences, activities limitations, depressions, and indirect societal burdens. In the global burden of diseases study LBP ranked highest in terms of disability and sixth in terms of overall burden.⁽¹⁾ the majority of primary episodes of back pain are mechanical, postulated to arise from an injury to or damage of some structure within the spine⁽²⁾. **Mechanical back pain** is a type of back pain in which pain in unilateral side of back with no referral below knee which may be caused by injury to muscles strain, ligaments sprain, or injury to the facet joint⁽³⁾. So, basically mechanical low back pain is damage or rather tension, soreness or stiffness to muscles, soft tissues of lower back region⁽⁴⁾.

At present, there is high prevalence of low back pain (40.7%) in subjects aged 20 years or above. The prevalence was significantly higher among women (52.9%) compared with men (28.4%) and the difference was statistically significant ($P <$

0.001). In other words, one out of three people in the field practice area had at least one day low back pain in the past one year⁽⁵⁾.

In India LBP prevalence has been found to range from 62% to 92% with increase of prevalence with age and female population. Low socioeconomic status, poor education, previous history of LBP, physical factors such as anxiety, depression, job satisfaction, lack of job control or mental stress, working hours, obesity have been found to be associated with LBP⁽⁶⁾.

From last several years in physical therapy, *treatment* for low back pain consists of wide varieties of choices including exercises like Manual therapy, Trunk Coordination, Strengthening exercises, Traction, Nerve Mobilizations, William's exercises, McKenzie exercises⁽⁷⁾. Physical treatments such as Acupuncture, Back School therapy, Magnets, TENS, Ultrasound, Pilates therapy, Alexander technique, Cranio

Sacral therapy are still found lacking in effective evidences over treatment of long term low back pain⁽⁸⁾.

Muscle Energy Techniques (MET) are recently developed popular therapeutic modalities aimed at the improvement of elasticity in contractile and non-contractile tissues⁽⁹⁾. MET can be used to lengthen a shortened muscle; mobilise an articulation with restricted mobility; strengthen a physiologically weakened muscle; reduce localised edema and passive congestion. MET uses the voluntary contraction of the patient's muscle in a precisely controlled direction against an externally applied counter-force, which is applied by the operator⁽¹⁰⁾.

So the aim of the study is to check the effect of Muscle Energy Technique of erector spinae muscle on pain, functional disability and lumbar range of motion in person's with mechanical back pain.

2. Methods

Sixty five Participants suffering from low back pain were screened from various physiotherapy clinics from different areas of city Ahmedabad. The subjects with age group 20-40 years , male and female having mechanical back pain less than 6 months with VAS scale more than 2, with positive leg length test for erector spinae muscle were selected in the study⁽¹⁵⁾. Lumbar radiculopathies, spinal stenosis, deformities, rheumatoid arthritis, osteoporosis, traumatic back pain history, disc injuries were excluded from the study. Ethical approval was taken prior to the study conducted.

According to inclusion criteria 46 patients randomly divide in two groups. Group A was treated with MET and conventional back exercises and Group B was treated only with conventional back exercises. The participants were analyzed with inclusion criteria and then general assessment done with including 1) demographic database 2) Visual Analog Scale(VAS) to measure pain intensity 3) Modified Oswestry Disability Index for measuring functional disability of lumbar spine 4) lumbar ROM from modified modified scober's technique. Outcome data was taken on first day and then after 2 weeks. Total 8 sessions in 2 weeks given to the patients.

1. **Visual Analog Scale (VAS)⁽¹¹⁾** : The VAS is form of patient's perception outcome assessment that has been described as generally relevant, reliable, responsive and safe. With VAS, patients are asked to place a mark on the horizontal line, 10 cm in length, to indicate the severity of their pain.
The left end of line represents no pain and the right end represents severe pain. A clinician can measure the distance from the left end of the line to the patient's mark and give it a numerical value.
2. **Modified Oswestry Disability Index (MODI)⁽¹²⁾** : the Oswestry Disability Index was developed by Fairbank

JCT and Pynsen. This test is considered to be the 'gold standard' of low back functional outcome tools.

3. **Range Of Motion (ROM)⁽¹³⁾** : Modified and Modified Schobers technique which is also known as Skin Distraction method which is mainly used for measuring lumbar range of motion using tape measurement. It is reliable method to check measurement of lumbar flexion and extension.

APPLICATION OF MUSCLE ENERGY TECHNIQUE: (EXPERIMENTAL GROUP)

According to post isometric relaxation method of MET for rector spinae patient's position is sitting on stool with hip and knee flexed with feet contact on ground. Hand on the treatment side rested behind the head and another hand support the opposite elbow. Therapist stands at the affected side of patient and move the patient in flexion, side flexion and rotation in same side. After taking the patient into comfortable limit of flexion he is asked to look towards the moving direction while applying upto 20% of pressure maintaining for 7 to 10 seconds. During isometric contraction subject is asked to hold the breath. After proper full exhalation muscle was stretched to the new restriction barrier. Same procedure was repeated for three times.

APPLICATION OF CONSERVATIVE BACK EXERCISES: (CONTROL GROUP)

In conservative control group treatment global multi segmental muscle activation like as (straight leg raise, single knee to chest, double knee to chest, curl up, prone hip extension, bridging, prone on elbow, cat-camel exercises) and segmental muscle activation such as drawing- in maneuver with 10 sec hold were given to the patients for 10 repetitions for 2 weeks.

3. Data Analysis

Data was analyzed by using SPSS software version 20.0.data was screened for normal distribution. All the outcome measure data were analyzed at baseline and after 2 weeks. Pre and post data within the groupA and B were analyzed by Wilcoxon signed rank test. Pre and post data between the group A with B were analyzed by Mann- Whitney U test. The P value was set at 0.05.

4. Results

Within the group analysis using wilcoxon signed rank test showed that there is significant improvement of VAS in both the groups from prior to session to 8th session of intervention. Both groups showed improvement in MODI and lumbar ROM in pre to post analysis data. Between the group analysis using mann whitney U test showed that there is significant improvement in VAS and MODI in pre and post data analysis. Mann- Whitney U test showed non significant improvement in lumbar ROM between the group analyses.

Table 1.1 age and gender distribution in both groups

Variables	Age (Mean ± SD)	Male patients	Female patients	No. of patients
Group A	31±5.59	12	10	22
Group B	30.47±5.96	09	11	20

Table 1.2 Wilcoxon Test for within group analysis

Variables	Group A				Group B			
	Pre treatment (Mean \pm SD)	Post treatment (Mean \pm SD)	Z value	P value	Pre treatment (Mean \pm SD)	Post treatment (Mean \pm SD)	Z value	P value
VAS	5.62 \pm 1.1	1.45 \pm 0.69	4.107	0.001	5.3 \pm 1.08	2.41 \pm 0.82	4.017	0.001
MODI	33.5 \pm 5.58	16 \pm 5.37	4.111	0.001	32.09 \pm 4.31	19.04 \pm 3.66	4.025	0.001
Lumbar ROM	2.99 \pm 0.67	5.69 \pm 0.38	4.112	0.001	3.04 \pm 0.73	5.17 \pm 0.57	4.016	0.001

Table 1.3 Mann Whitney U Test between group analysis

Variables	Difference in VAS (Mean \pm SD)	U value	P value	Difference in MODI (Mean \pm SD)	U value	P value	Difference in ROM (Mean \pm SD)	U value	P value
Group A	3.86 \pm 1.46	142.5	0.031	17.5 \pm 7.47	150.5	0.049	2.7 \pm 0.76	155.5	0.066
Group B	2.89 \pm 1.15			13.05 \pm 5.43			2.1 \pm 0.88		

5. Discussion

In the present study of 2 weeks intervention program, there were significant reduction in pain, decrease in functional disability and improvement in lumbar range of motion in both the groups. The Group A showed better improvement on reducing pain and functional disability than Group B, while on improving lumbar range of motion there was non significant improvement seen on lumbar flexion ROM between both groups.

In analysis of **pain** with in Group A and B both showed statistically significant result in reduction of pain. In analysis of pain between group, experimental group showed better improvement in pain with VAS score. The reduction in pain due to MET can be confirmed on the basis of neurophysiology of PIR method. The Golgi tendon organ receptors which situated in tendon of the agonist muscles react to overstretching of the muscle by inhibiting further muscle contraction. A strong muscle contraction against equal counterforce triggers the Golgi tendon organ. So, with increased tension to affected muscle, afferent nerve impulse from stretch receptors enters dorsal root of the spinal cord & stimulates inhibitory motor neurone which reduces pain, dysfunction and restores the muscle to full stretch length⁽¹⁶⁾. **M. Selkow et. Al.** concluded that MET is effective in decreasing pain in patients with acute low back pain⁽¹⁷⁾. Study by **Brinda S.** suggested that there was significant reduction in VAS score and resultant disability in both the groups⁽¹⁸⁾. Results also suggested improvement on pain in conventional therapy group. Studies suggested that by beginning of back pain there is inhibition of movements & activities which also reinforced by health care providers through their advice to avoid movement which induce pain. Reversal of these impairments in back pain can be produce by correcting the stretch reflex by isometric exercises and spinal flexion and extension exercises. **Koumantakis et. al.** concluded in their study that general trunk muscle exercises alone, without the addition of stabilization exercises, reduce pain more effectively after the end of 2 month exercise period⁽¹⁹⁾.

In analysis of **functional disability** both Group A and B showed statistically significant result in reduction of it. Subjects treated with MET along with conventional therapy had shown

more improvement on functional disability than another group. It has correlated that reduction in pain by MET cause functional activities more efficiently with reduced extra effort during work and activities that result in improvement in MODI score. A study of **Patil Prassci et al.** also concluded and supported the efficacy of MET in reducing disability⁽²⁰⁾. The another study done by cap **Eric Wilson** reported that MET decreased disability and improved function in patients with acute low back pain⁽²¹⁾. The study was done by **Aura et al.** have negatively suggested that manual therapy and specific adjunct exercise do not have significant impact on reducing disability and also concluded that the aerobic exercises has greater impact on reducing disability in chronic back pain patients⁽²²⁾. In study, improvement was also seen in conventional therapy group on functional disability which suggests that conventional exercises improve functional abilities in work by reducing pain. As reduction in pain improved muscle activity which prevent deconditioning of muscle fibers.

In analysis of **range of motion** for within group, Group A and group B showed statistically significant result in reduction of ROM. In analysis of Range Of Motion for between groups, the P value was not significant. Thus, Subjects treated with MET along with conventional exercises had not show significant improvement in range of motion as compared to other group treated with only conservative therapy. It is suggested by Greenman who has stated that function of any articulation of the body which can be moved by voluntary muscle action, either directly or indirectly can be influenced by MET procedure, so this can be used to lengthen a shortened, hypertrophic or tight muscle, strengthen the weak muscles, and relieve passive congestion and edema⁽¹⁵⁾. In a study done by **bidra et al** low back pain with sacroiliac joint disorder can be successfully managed using MET along with conventional therapy. By giving MET along with conventional therapy there was improvement in lumbar spine ROM which relieve sacroiliac joint dysfunction⁽¹⁸⁾. Another study done by **Patil et al.** concluded that MET on quadratus lumborum combined with interferential therapy was more effective in reduction in disability and increasing spinal range of motion than interferential therapy alone in patients with acute low back pain⁽²⁰⁾. The researcher R. **Schenak et al.** indicted that MET of eight sessions two times per week for 4 weeks gives

significantly improvement in lumbar extension range of motion⁽²³⁾. As per the result, the conservative therapy has also shown improvement with group B. Long term back pain cause inhibition of movements and physical inactivity, loss of spinal flexibility & shortening of muscles and connective tissues of the spine. Exercises improve and maintain muscle extensibility. This result is supported by the study done by **jalavand et al.** who concluded that exercise is more effective in decreasing pain & disability from LBP than control treatments or physician consultation⁽²⁴⁾.

Limitation of the study was unequal gender ratio, small duration of study, no followup, no blinding. It was difficult to explain about applying 20% of strength during isometric contraction in MET by the patients. **Future studies** can be done with large sample size and for longer duration. Studies

can be done on comparison with 2 techniques of MET or any other techniques and MET.

6. Conclusion

Muscle energy technique on erector spinae muscle is more effective in reducing pain and disability and less significant improvement in lumbar range of motion in subjects with mechanical back pain. Conservative therapy along with muscle energy techniques gives better reduction in lumbar back pain and improvement in functional disability in subjects. In subjects with back pain, Muscle Energy Techniques can be used as a new adjunct of manual therapy. For lumbar ROM though MET is less significant but clinically it gives effective results to the subjects.

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