Mets and oscillating energy manual therapy in chronic lateral epicondylitis: a comparative study

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**ABSTRACT**
Lateral Epicondylitis (LT) term was used previously thinking that it as an inflammatory condition, but it is tendinosis of Common extensor tendons of the forearm due to overuse. The incidence of the condition is about 4000 - 7000 per year in the general population in the United States. Conventional treatments practiced on the concept of inflammation have shown forty to eighty percent of unsuccessful results. Individuals with lateral epicondylitis may have symptoms like pain during activity, weakness, swelling and functional disability. The primary objective of the study is to find out the effectiveness of oscillating energy manual therapy (OEMT) compared with muscle energy technique (MET) on functional outcome in subjects with lateral epicondylitis. Total of 30 subjects with unilateral lateral epicondylitis was selected and was divided into two groups of 15 each in a group. Group A (received oscillating energy manual therapy) and Group B (received muscle energy technique). NRS (Numerical Rating Scale), Grip Strength and PRTEE (Patient Rated Tennis Elbow Evaluation) scale were measured pre and post-treatment for both the groups and also at follow up of the sixth week. Muscle energy technique group showed improvement in pain levels, muscle strength and functional activities. The statistical analysis demonstrated that results were more significant in group B at 4th week and also at follow up with a mean difference of (2.3) for NRS, (57.4) for PRTEE and (5.9) for grip strength than group A.

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**INTRODUCTION**
Lateral epicondylitis is one of the most common non-traumatic elbow disorders. It was first described by [Runge, 1873]. The incidence of lateral epicondylitis in the general population is about 4 to 7 per 1,000 per year and about 9.1% in tennis players [Gruchow and Pelletier, 1979]. Most commonly occurs in the fourth or fifth decade with equal incidence in men and women [Romeo et al., 2010]. Extensor carpi radialis brevis (ECRB) is the most commonly affected muscle, but up to 50% of patients will also have degeneration of the extensor digitorum
communis. Initially, the pathology was assumed to be tendinitis, but now it is known as tendinosis with degeneration and angiofibroblastic hyperplasia (Kraushaar et al., 1999) and as such the correct terminology of the condition is lateral epicondylitis. If it is micro trauma of muscle fiber, as previously assumed pathophysiology of lateral epicondylitis, must heal in 3-5 days of the injury but the tendon injuries may take 5 weeks for healing. Because of reduced blood supply, many cases cross the expected healing time leading it to a chronic condition. Because of the absence of inflammatory cells shown in histopathological studies, it is evident that it is chronic degeneration with the presence of fibroblasts, collagen in a disorganized way and increased blood cells (Gordon and Blair, 1995) causing it an angiofibroblastic condition. Conventional treatments practiced on the basis of inflammation have shown thirty-nine to eighty percent of unsuccessful results. Rest, ultrasound, stretching, strengthening exercises, steroid injection, iontophoresis, friction massage, counterforce bracing, extracorporeal shock wave therapy, Platelet-rich plasma injection, phototherapy and surgery are the commonly used interventions either in single or in combination. Another approach suggests that it could be due to the presence of active tender points on hand and wrist extensor muscles. Oscillating energy Manual Therapy (OEMT), also known as V-spread, is a craniosacral manual technique (Upledger, 1997) it has been shown effective for chronic lateral epicondylitis (Nourbakhsh and Fearon, 2008). Muscle Energy Technique (MET) is a manual therapy involving isometric contraction (Chaitow et al., 1996) which aims in improving musculoskeletal function, and decreasing pain levels in lateral epicondylitis are shown to be effective (Kukusen s et al., 2013).

Limited studies were present on oscillating energy manual therapy and muscle energy technique in lateral epicondylitis; the present study aimed at finding out the effectiveness of oscillating energy manual therapy versus muscle energy technique on pain, grip strength and functional abilities in individuals with chronic lateral epicondylitis.

MATERIALS AND METHODS

Procedure

1. The study was conducted on 30 subjects with lateral epicondylitis at Susrutha Institute of Physical Medicine and Rehabilitation, Hyderabad, India after informed consent and institutional ethical committee approval. The subjects were randomly selected according to the inclusion (both gender, age 25-45 years with chronic lateral epicondylitis and presence of tender points) and exclusion criteria (cervical spine disorders, peripheral neuropathy, Fractures, major upper limb surgeries, use of steroid injection during the last six months for severe pain, tumor and wounds around the involved elbow joint). The patients were divided into two groups (Group A and Group B) by convenient sampling.

- Group A: oscillating energy manual therapy
- Group B: muscle energy technique

The study was carried on for a period of 4 weeks. Both the groups were evaluated for pain by NRS, grip strength by a dynamometer and functional ability of the elbow joint by PRTEE pre-treatment and post-treatment and also at follow up of the 6th week.

**Group A:** (treated with oscillating energy manual therapy)

**Technique:** It is also known as V-spread and is performed as described in many osteopathic books (Upledger, 1997). The subject was asked to sit on a chair with the affected painful arm resting on the treatment table. Tender points were palpated. Then the therapist places the index and middle fingers of one hand in a V-shape around the tender point and placed the index finger of the other hand in the medial side of the elbow, diagonally across the located tender point. Gentle pressure was applied a few times using fingertips to the tissues alternatively from the medial and lateral sides to start the oscillations. On the initiation of oscillations, the application of pressure should be stopped and allow the oscillations to continue between the two points of contact on the subject’s elbow. This technique was repeated until there were no tender points on palpation (Nourbakhsh and Fearon, 2008). The duration varied from 30 seconds to 2 minutes. The same technique was repeated for all tender points, each session lasting for 20-30 minutes applied in 2 sessions for a week for 4 weeks. After 4 weeks of treatment pain, grip strength and functional status of the elbow joint was measured by using NRS, Dynamometer and PRTEE and follow up was done at 6th week.

**Group B:** (treated with muscle energy technique)

**Technique:** This technique was applied by allowing the subject to sit comfortably and then stabilize the subject’s distal humerus with one hand, then the forearm was supinated with the therapist another hand until resistance appeared. Holding the position the subject was asked to slowly pronate.
the forearm that is Isometric contraction against re-
sistance for a period of five seconds, followed by
slightly increasing supination until resistance was
met once again. After five seconds of relaxation,
the procedure was repeated 5 times during a single
treatment session; this technique was applied in 2
sessions for a week for 4 weeks. After 4 weeks of
treatment pain, grip strength and functional status
of the elbow joint was measured by using NRS, Dy-
namometer and PRTEE and follow up was done at
6th week. Figure 1 shows that,

Statistical analysis:
Statistical analysis was performed by using SPSS 9,
MS EXEL. Descriptive analysis was used to analyse
the data in each subject [Group A & Group B].
WILCOXON SIGNED RANKS TEST was performed
Inter (within) groups (Group A & Group B). For
strength, PAIRED-T-TEST was performed. MANN-
WHITNEY TEST was performed Intra (between)
groups (Group A & Group B), and for strength,
INDEPENDENT-T-TEST was performed.

RESULTS AND DISCUSSION
The present study has compared the muscle energy
technique with oscillating energy manual therapy
to evaluate pain intensity, grip strength and func-
tional ability in subjects with lateral epicondylosis.
Group A was given oscillating energy manual ther-
apy, and group B was given a muscle energy tech-
nique. The analysis of mean NRS score within the
group that measured at baseline, post-treatment,
and after 6 weeks follow up of intervention in both
the groups found that there is a significant difference
in post-treatment means. The participants in Group
B found significant improvements in NRS from a
baseline score of mean 7.4 to 2.3 (4th week) and 2.6
(6th week). The participants of Group A also showed
improvements in NRS with a baseline score of mean
7.6 to 4.4 (4th week) and 4.6 (6th week). But there
was more statistically significant difference in pain
levels in Group B than Group A. Decrease in the level
of pain perceived is due to the decrease in neuro-
physiological pain. We hypothesized that during the
treatment session, manual contact with the patient
might have resulted in alteration of pain, through
the neurophysiological mechanisms of movement
performed. The decrease in pain perception in the
group can be correlated with this effect of clinical
touch.

The activation of agonist and antagonist muscles,
along with clinician touch, seems to alter the percep-
tion of pain.

Even though the literature on MET intervention for
the management of LE is lacking, our study results
are correlated with the results of the study done by
(Selkow et al., 2009) on the short-term effects of
MET on pain in individuals with nonspecific lum-
bopelvic pain, has also shown improvements in pain
levels.

However, the results of VAS were contradictory to
the results of the study done by (Hariharasudhan
and Balamurugan, 2015) where METS was less effective
compared to mulligan even though it has a prognostic
effect.

According to Chaitow, MET is an active isometric
contraction method in which normal blood circula-
tion is increased, which removes nociceptive stimu-
lants from the site of pain and reduces pain lev-
ellevels. (Chaitow et al., 1996)

The analysis of grip strength and functional ability
within both groups found that there is a significant
difference in post-treatment means and follow up.
In group B, there is a significant improvement in grip
strength from a baseline score of mean 2.4 to 5.6 (4th
week) and 5.9 (6th week). Table 1 shows,

There were also improvements in scores of PRTEE
in both the groups, but it was more significant in
Group B with baseline mean value of 82.7 to 57.4
(4th week) and 60.6 (6th week) and at follow up re-
spectively.

A recent randomized controlled study by (kukusen
et al., 2013) compared METS with corticosteroid in-
jection and demonstrated significant improvements
in grip strength and functional ability in METS
group, similar results were observed in our study
also.

Statistical analysis of grip strength depicts that
strength improved significantly in METS group than
oscillatory technique group and the results are cor-
related with results of (Sarin et al., 2018) following
the application of 8 treatment sessions of METS
within 2 weeks. Table 2 and Table 3 Shows,

In the METS group, significant improvement occurs
in the functional outcome, which was depicted in
the statistical analysis of the PRTEE scale. Hence,
the improvement in the efficiency to do their routine
work occurs. This reduction in pain levels enhanced
in the performance of activities, which were earlier
painful.

The normal function of hand provides us with the
ability to perceive and manipulate objects in the en-
vironment, to achieve the normal function of hand;
proximal joints and musculatures should be opti-
mal enough to stabilize the hand and wrist which
helps to obtain precision and prehensile functions.
In LE due to Extensor carpi radialis brevis tendini-
Figure 1: Flow chart

Table 1: Group Statistics for NRS

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre_NRS</td>
<td>OEMT 15</td>
<td>7.4667</td>
<td>1.18723</td>
<td>.30654</td>
</tr>
<tr>
<td></td>
<td>METS 15</td>
<td>7.4000</td>
<td>1.35225</td>
<td>.34915</td>
</tr>
<tr>
<td>Post_NRS</td>
<td>OEMT 15</td>
<td>4.6000</td>
<td>1.35225</td>
<td>.34915</td>
</tr>
<tr>
<td></td>
<td>METS 15</td>
<td>2.3333</td>
<td>.97590</td>
<td>.25198</td>
</tr>
<tr>
<td>FollowUp_NRS</td>
<td>OEMT 12</td>
<td>4.5000</td>
<td>1.08711</td>
<td>.31382</td>
</tr>
<tr>
<td></td>
<td>METS 12</td>
<td>2.6667</td>
<td>.98473</td>
<td>.28427</td>
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</tbody>
</table>

Table 2: Group Statistics for PRTEE

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre_PRTEE</td>
<td>OEMT 15</td>
<td>88.2000</td>
<td>8.07288</td>
<td>2.08441</td>
</tr>
<tr>
<td></td>
<td>METS 15</td>
<td>82.7333</td>
<td>8.11935</td>
<td>2.09641</td>
</tr>
<tr>
<td>Post_PRTEE</td>
<td>OEMT 15</td>
<td>76.8667</td>
<td>9.03064</td>
<td>2.33170</td>
</tr>
<tr>
<td></td>
<td>METS 15</td>
<td>57.4667</td>
<td>8.14920</td>
<td>2.10412</td>
</tr>
<tr>
<td>FollowUp_PRTEE</td>
<td>OEMT 12</td>
<td>74.8333</td>
<td>7.82575</td>
<td>2.25910</td>
</tr>
<tr>
<td></td>
<td>METS 12</td>
<td>60.6667</td>
<td>9.12871</td>
<td>2.63523</td>
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</tbody>
</table>
Table 3: Group Statistics for GRIP STRENGTH

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre_strength</td>
<td>OEMT</td>
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<td>1.6000</td>
<td>.50709</td>
<td>.13093</td>
</tr>
<tr>
<td></td>
<td>METS</td>
<td>15</td>
<td>2.6667</td>
<td>.97590</td>
<td>.25198</td>
</tr>
<tr>
<td>Post_strength</td>
<td>OEMT</td>
<td>15</td>
<td>3.1333</td>
<td>.91548</td>
<td>.23637</td>
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<tr>
<td></td>
<td>METS</td>
<td>15</td>
<td>5.9333</td>
<td>1.16292</td>
<td>.30026</td>
</tr>
<tr>
<td>FollowUp_strength</td>
<td>OEMT</td>
<td>12</td>
<td>3.0833</td>
<td>.99620</td>
<td>.28758</td>
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<tr>
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<td>METS</td>
<td>12</td>
<td>5.6667</td>
<td>1.07309</td>
<td>.30977</td>
</tr>
</tbody>
</table>

tis, handgrip and movements are severely compromised. In any rehabilitation of the upper limbs, complete recovery must be achieved; if not, it can limit the quality of life and functional independence.

(Nayak et al., 2010) Lateral epicondylosis can be due to tendinogenic, articular, or neurogenic causes. Several theories have been laid down, and the most recent theory suggests that compression of posterior branch of the radial nerve at the elbow occurs during the repeated actions of the wrist extensor muscles, especially the extensor carpi radialis (Bunata, 2007)examined the anatomic factors related to the causes of lateral epicondylosis. When the elbow was extended, the undersurface of the extensor carpi radialis brevis rubbed against the lateral edge of the capitellum while the extensor carpi radialis longus compressed the brevis against the underlying bone. The results of these afore mentioned studies may help us to understand the pathomechanics of Lateral epicondylosis and supports the explanation of the mechanism of MET. Because of the combination of creep and plastic change in the connective tissue MET can release articular restrictions, elongate muscle fibers, and increase the joint range of motion.

The oscillating energy manual therapy (v-spread) was used to treat restricted cranial sutures in olden days, a modified version was proposed for treatment of somatic tender points. It is believed that biomagnetic energy is released from the therapist’s hand, as soft tissue healing is frequency-specific and respond well with a human touch. The electromagnetic fields have an effect on tissue healing, bone healing, synthesis of growth factor and connective tissue repair and healing (Michlovitz, 1996). According to (Oschman, 2002) electromagnetic signals range from 0.3hertz to 30 hertz and with most signals of 7 to 8 hertz can be omitted from therapist touch. The improvements in subjects receiving oscillatory technique could be due to the release of these electromagnetic fields from the therapist’s hand and increase in the synthesis of collagen by fibroblast may occur as the cause is angiofibroblastic. This therapy is shown effective in the treatment of fibromyalgia patients (Sánchez and Mataran, 2011). In Group B individuals receiving muscle energy technique, according to L.chaitow, the Musculoskeletal system is the primary machinery of life, because of repetitive biomechanical stress on soft tissues pathological changes occur. Golgi tendon organ activates when the patient performs an isometric contraction, which results in direct inhibition of agonist’s muscles and a reflexive, reciprocal inhibition occurs at the antagonistic muscles. During relaxation, both muscle groups are inhibited, and a new range of motion is achieved. The muscles are stretched, and viscoelastic changes occur there is increased blood flow to the area, and lymphatic drainage is increased because of this possible mechanism there is a reduction in pain levels and functional improvement in many patients. Many researchers have used METS in the treatment of musculoskeletal disorders. (Mahajan et al., 2011) in their study showed that METS is effective in reducing pain and in increasing cervical range of motion in sub-acute neck pain.

(Moore et al., 2011) investigated the effect of METS on horizontal abductors and showed improvement in the gleno humeral Joint adduction and internal rotation in the tightness of posterior shoulder.

In speculation of the results obtained, METS is more effective than oscillating energy manual therapy. This is due to the fact that METS addresses the pathology directly by correcting muscle imbalance, which was not obtained with oscillating energy manual therapy. Hence, METS should be the superior treatment approach in the management of LE complimented by oscillating energy manual therapy and other interventions.

Limitations of the study are, despite the significant effects demonstrated in this study, the larger sample size may improve reliability and gives more precision. Effective use of OEMT requires some skill and experience. Need to find out the consistency of technique. Further clinical studies are needed to explore the mechanism.
CONCLUSION

The results of the present study concluded that oscillating energy manual therapy and muscle energy technique had shown the improvement in NRS, grip strength and PRTEE in lateral epicondylitis subjects, but more significant improvement was observed in the subjects who were treated with muscle energy technique than oscillating energy manual therapy.

REFERENCES


