The Effect of Muscle Energy Techniques on Disability and Pain Scores in Individuals With Low Back Pain

Joseph M. Day and Arthur J. Nitz

Clinical Scenario

Low back pain is the most common type of pain reported by adults in the United States. A variety of manual therapy techniques are used in the management of low back pain to reduce pain, improve function, and reduce disability. In recent years, muscle energy techniques have been increasingly used in clinics to treat low back pain. By definition, a muscle energy technique involves the patient performing a voluntary muscle contraction “in a precisely controlled direction, against a distinctly executed counter force applied by the operator.” Muscle energy techniques provide a conservative alternative for clinicians treating patients with precautions or contraindications to joint manipulation.

Focused Clinical Question

For individuals with acute lumbopelvic pain (LPP), is there evidence to suggest that muscle energy techniques are effective in reducing pain and disability scores?

Summary of Search, “Best Evidence” Appraised, and Key Findings

- The literature was searched for studies that investigated the effect of muscle energy techniques on disability and pain scores in patients with acute LPP.
- Two randomized controlled trials were included.
- In individuals with acute LPP, muscle energy techniques have been demonstrated to reduce worst pain scores over a 24-hour period.
- Muscle energy techniques appear to be effective in combination with exercise in reducing disability scores over a 4-week period compared with exercise only.
- Muscle energy techniques may be more effective in reducing pain and disability after multiple treatment sessions and in combination with other treatments such as therapeutic exercise.

Clinical Bottom Line

On the limited basis of 2 randomized controlled trials, it can be concluded that there is minimal evidence (level 4) to support the use of muscle energy techniques for reducing pain and disability scores in individuals with acute LPP. These results are cautiously drawn secondary to the limited number of available studies and concerning the clinical effect of muscle-energy-technique procedures.

Strength of Recommendation: Based on the Centre for Evidence-Based Medicine, there is level C evidence that muscle energy techniques directed at the lumbopelvic spine significantly reduce pain and disability scores.

Search Strategy

Terms Used to Guide Search Strategy

- Patient/Client group: lumbar pain, lumbopelvic pain, low back pain
- Intervention/Assessment: muscle energy technique, inhibition/facilitation technique, manual therapy
- Comparison: control
- Outcome(s): pain and disability

Sources of Evidence Searched

- PEDro
- Cochrane
- EBSCOHost (CINHAHL, MEDLINE, Academic Search Premier, SPORTDiscus, Health Source)
- PubMed
- Ovid SP

Inclusion and Exclusion Criteria

Inclusion Criteria

- Studies that measured disability or pain scores
- Subjects with acute LPP

The authors are with the Dept of Rehabilitation Sciences, University of Kentucky, Lexington, KY.
Additional, Wilson et al used stratified randomization, blinded to the group to which the subject was allocated. Therefore, this statistically significant difference does not appear to represent a meaningful clinical difference. As with all manual therapy studies, the study by Wilson et al may have introduced bias because the therapist administering the muscle energy techniques could not have been blinded to the group to which the subject was allocated. In addition, Wilson et al used stratified randomization, which does not allow for a truly random allocation and increases the potential for sampling errors.

In addition to the limitations of each individual study, this critically appraised topic presents a limitation. Each study had several distinct design differences, so it is difficult to make a definitive conclusion. The study by Wilson et al included patients referred to an outpatient clinic, it included a cointervention along with muscle energy techniques, and treatment was undertaken 2 times a week over a 4-week period. In contrast, the study by Selkow et al included volunteers with low back pain in a university setting, there was no other intervention included, and results were analyzed after a single application of a muscle energy technique. The muscle energy techniques were also different in the 2 studies. Wilson et al used a technique directed at the lumbar spine, and Selkow et al used a technique directed at the lumbopelvic region.

Although there were several limitations to these studies, we were able to make clinical recommendations based on their strengths. The study by Wilson et al demonstrates high external validity secondary to the study being clinically driven. For example, therapeutic exercises were used in conjunction with the muscle-energy-technique treatment and the trial was conducted over a 4-week period. The study by Selkow et al was well designed with true randomization and used a double-blinded procedure.

Based on the limited evidence from 2 eligible studies and limitations found in each study, we are unable to definitively recommend muscle energy techniques for the purpose of reducing pain and disability scores in our patients. However, preliminary evidence suggests that muscle energy techniques may be effective for patients with acute LPP at lower pain levels (2–3/10 on the VAS). In addition, this technique may be best used in conjunction with therapeutic and motor-control exercises.

Finally, muscle energy techniques may have a greater impact on outcomes when administered over more than 1 treatment session in conjunction with therapeutic and motor-control exercise.

Future research should include well-designed prospective studies with a larger population of patients, adequate follow-up, and an intention-to-treat analysis. Both studies included instructions for the patient to hold the isometric contraction for 5 seconds and perform the procedure 4 times; however, future studies should investigate the most effective contraction times, number of repetitions, and number of visits. Muscle energy techniques should also be compared with other types of manual therapy interventions (joint mobilization or manipulation, soft-tissue mobilization, and mobilization with movement) to determine its effectiveness. Although the treatment-based classification system is helpful, it does not include muscle energy techniques. Future studies should determine specific patient characteristics and employ treatment-based categories similar to those of

### Table 1: Summary of Study Designs of Articles Retrieved

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Study design</th>
<th>Number of studies located</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2b</td>
<td>Randomized controlled trial</td>
<td>2</td>
<td>Wilson et al and Selkow et al</td>
</tr>
</tbody>
</table>

**Implications for Practice, Education, and Future Research**

Overall we found minimal evidence that muscle energy techniques reduce pain and disability scores in individuals with acute LPP. There are some important limitations and strengths of each study that led to this conclusion. Both studies used small sample sizes, and no follow-up measures were taken after the episode of care. The study by Selkow et al reports a significant reduction in worst pain scores over a 24-hour period. However, on an 11-point scale, the significant difference was less than 1 point. A previous study concluded that the minimal clinically importance difference in reported pain is 2 points. Therefore, this statistically significant difference does not appear to represent a meaningful clinical difference. As with all manual therapy studies, the study by Wilson et al may have introduced bias because the therapist administering the muscle energy techniques could not have been blinded to the group to which the subject was allocated. In addition, Wilson et al used stratified randomization, which does not allow for a truly random allocation and increases the potential for sampling errors.

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Table 2  Characteristics of Included Studies

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<th>Selkow et al\textsuperscript{4}</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study design</strong></td>
<td>Stratified randomized controlled trial (pilot)</td>
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<tr>
<td><strong>Participants</strong></td>
<td>16 patients referred to an outpatient physical therapy clinic with a diagnosis of low back pain or lumbar strains (20–40 y), 8 women, 8 men. Patients were randomized with stratification into control and experimental groups. Inclusion criteria included low back pain of no more than 12 wk, age range 18–65 y, initial Oswestry Disability Index score of 20–60%, a PT diagnosis of low back pain without radiation of symptoms, and an extended, rotated, and side-bent restriction as defined by Greenman.\textsuperscript{3} Exclusion criteria included radicular pain, motor weakness, absent or diminished muscle-stretch reflexes, spondylolisthesis, chronic low back pain, and previous low back surgery. Groups were comparable at the start of the study. Initially 3 participants dropped out but were replaced. 100% follow-up in both groups.</td>
<td>20 volunteers recruited by university e-mail, 16 men and 4 women, mean age 24 y. Subjects were randomized with stratification into control and experimental groups. Exclusion criteria included low back pain lasting longer than 6 wk, pain distal to the knee, previous low back surgery, and low back pathology diagnosed by a physician. Groups were comparable at the start of the study. 100% follow-up in both groups.</td>
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<td><strong>Intervention investigated</strong></td>
<td>All groups first received 20 min of moist heat. The experimental group received MET in the side-lying position based on the diagnosis by the primary investigator. Four contractions were performed with a 5-s hold. An HEP was given to the MET group consisting of neuromuscular reeducation in the direction of restriction and a drawing-in technique of the transverses abdominis, which was progressed in consecutive visits. For subsequent visits, MET was administered only when a biomechanical restriction was found. The control group received PROM in the side-lying position for approximately 5 min. The placebo was randomly administered. The placebo group did not receive a neuromuscular-reeducation HEP but did receive the same drawing-in technique progression. All patients then received a standardized group of exercises that were progressed by a second therapist. The subjects were blinded, but the therapist and assessors were not.</td>
<td>Each group was randomly assigned to receive an MET or a sham technique. The MET was performed in supine with the subject’s buttocks just off the edge of the table. The leg on the side of the anterior innominate was placed on the provider’s shoulder, and the patient was asked to push the leg into the examiner’s shoulder and push up with the opposite leg. Four contractions were performed with a 5-s hold and 5-s rest between contractions. The sham was gentle pressure on the anterosuperior iliac spine with the subject in supine for 30 s. The treating therapist was blinded, but the subjects and assessors were not.</td>
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The primary outcome measure was the Oswestry Disability Index, a 10-item scale that measures disability in patients with low back pain. The range of scores can be 0–100%, and the minimal clinically important difference is 10%. A higher score represents a higher disability.

The outcome measures were taken before treatment, immediately after treatment, and 24 h later. Primary outcome was pain (current pain, worst pain) measured on a visual analogue scale. The secondary outcome was pain-provocation testing (the one causing most pain, and how many tests caused pain). Tests: SI distraction and compression, thigh thrust, Gaenslani’s, and FABREs.

The mean percent change score within subjects for each group was recorded. The mean percentage change in disability scores for the treatment group was 83%, compared with 65% for the control group. An independent 2-tailed t test revealed a statistically significant difference in favor of the experimental group, $P = .05$. Mean number of MET procedures required in the experimental group was 3.

Separate 2 × 3 mixed-model ANOVAs were used to analyze all visual analogue scale scores, and the Mann–Whitney U test was used to examine the number of positive pain-provocation tests before and after intervention. The results from the analysis showed that the MET grouped demonstrated a significant decrease in worst pain in 24 h, whereas the control group’s pain increased ($P = .03$). When both groups were analyzed together, the results showed a significant decrease in current pain ($P = .04$) and worst pain-provocation test 24 h after treatment ($P = .01$).

When examining the short-term effects of MET, response to worst pain over a 24-h period was significantly less than in the control group. In addition, the decrease in pain tests across both groups may be partially attributed to the effect of clinical touch on pain.

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<td>Level of evidence</td>
<td>2b</td>
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</tr>
<tr>
<td>Validity score</td>
<td>PEDro 4/10</td>
<td>PEDro 7/10</td>
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<td>Conclusion</td>
<td>MET combined with supervised neuromuscular reeducation and resistance-training exercises may be superior to PROM with supervised neuromuscular reeducation and resistance training for improving disability in patients with acute lumbar pain. The study also found that the mean number of MET procedures was 3, suggesting that a small number of interventions could be effective at reducing disability scores.</td>
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PT, physical therapy; MET, muscle energy technique; HEP, home exercise program; PROM, passive range of motion; SI, sacroiliac; FABREs, flexion, abduction, external rotation of the hip.
other interventions for LPP (manipulation, stabilization, direction-specific exercise, and traction).6

References