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Immediate effects of muscle energy technique on kinematics, pain, and disability in patients with chronic low back pain of zygapophyseal joint origin

Submission date
03/11/2017

Recruitment status
No longer recruiting

Registration date
13/11/2017

Overall study status
Completed

Last Edited
09/11/2017

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
The zygapophyseal joints in the back can cause low back pain. Pain from these joints happens in around 75% of people who have chronic low back pain. A physiotherapy technique called muscle energy technique has been used to treat this condition and is effective for decreasing pain, improving movements, and decreasing disability. The aim of this study is to measure the changes in spine movement, pain intensity and disability level before and after treatment.

Who can participate?
Patients 18-60 years old with low back pain for at least 3 months

What does the study involve?
Participants are randomly allocated into two groups. The intervention group is treated with muscle energy technique, and the control group is treated with lumbar stabilization exercise. Spine movement, pain intensity and disability level are assessed before and after treatment.

What are the possible benefits and risks of participating?
Possible benefits include increased active range of motion and decreased pain intensity and disability level. There are no possible risks of participating.

Where is the study run from?
Mahidol University (Thailand)

When is the study starting and how long is it expected to run for?
January 2014 to April 2015

Who is funding the study?
Directorate General of Higher Education (Indonesia)

Who is the main contact?
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
MU-IRB 2014/006.0901

Study information

Scientific Title
Immediate effects of muscle energy technique on kinematics, pain and disability in patients with chronic low back pain of zygapophyseal joint origin: a randomized controlled trial

Study objectives
1. There were significant differences in lumbar active range of motion in patients with chronic low back pain from zygapophyseal joint origin who received muscle energy technique or lumbar stabilization exercise.
2. There was significant difference in pain intensity in patients with chronic low back pain from zygapophyseal joint origin who received muscle energy technique or lumbar stabilization exercise.
3. There was significant difference in disability level in patients with chronic low back pain from zygapophyseal joint origin who received muscle energy technique or lumbar stabilization exercise.

Ethics approval required
Old ethics approval format

Ethics approval(s)

The Ethics Committee Mahidol University Institutional Review Board, MU-IRB, 21/03/2014, COA. No. 2014. 033.2103

Study design
Single-centre randomized controlled trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Chronic low back pain from zygapophyseal joint origin

Interventions
All subjects are randomly allocated into two groups, the intervention group was treated with muscle energy technique as intervention group, and the control group with lumbar stabilization exercise.

1. Muscle energy technique
The selection of technique was based on subject's symptom according to Greenman's approach. Prior to the intervention, the physical therapist assessed the resistance barrier accurately. Due to chronic condition of the subjects in this study, light to moderate contraction forces were applied for more than 20% but not more than 35% of available strength of subjects according to Janda approach and physical therapist provided equal counterforce to the subject's effort and the force was sustained. The contraction duration was 3 to 5 seconds. After contraction effort, subject was instructed to completely relax. During relaxation phase, physical therapist reengaged movement limitation and then retested. Before repositioning on a new barrier resistance, the subject was relaxed and his/her muscles could be stretched to a new resting length without resistance. These procedures were repeated three to five times.

2. Lumbar stabilization exercise
This procedure referred to the exercise for relearning a precise co-contraction pattern of the deep trunk muscles including the transversus abdominis and lumbar multifidus muscles. Before exercise, abdominal breathing and quadruped abdominal hallowing were conducted as training before pre-test. Exercises included abdominal hollowing, unilateral abduction, unilateral knee extension, unilateral knee raise, bilateral knee raise, and bilateral knee raise together. Every subject did not receive the same level of exercises. The whole session took 25 minutes, or less depending on the ability of movement learning.

Intervention Type
Other

Primary outcome(s)
Kinematics of lumbar spine (active range of motion (AROM) of flexion, extension, left and right lateral flexion, and left and right rotation), measured using 3D Vicon Nexus 1.8.4 motion systems before and immediately after intervention

3D Vicon Nexus 1.8.4 motion systems was used. A reflective markers using the spinal wand model was attached over specific anatomical landmark on 12th thoracic segment. For pelvis segment, the markers were placed over the left and right anterior superior iliac spines and the midpoint between the left and right posterior superior iliac spines. The movements measured included flexion, extension, right lateral flexion, left lateral flexion, right rotation, and left rotation. The measurement protocols were as follows. For flexion, the subject stood with feet shoulders' width apart. Running both hands down front of both legs, the subject was instructed to flex spine as far as possible while keeping knees extended. The subject then returned to starting position. For extension, position was similar with flexion, except the subject placing hands on waists, and bent backward as far as possible while keeping knees extended. The subject then returned to starting position. For right and left lateral flexion, the subject was asked to running hand down side of leg, then laterally flexed spine as far as possible. The subject kept knees extended and did not bend trunk forward or backward while performing movement. The subject then returned to starting position. For right and left rotation, the subject sat erect on stool, arms crossed and hands on opposite shoulders. The subject was asked to rotate spine as far as possible without arms and hand moving. During rotation, no lateral flexion occurred. The subject then returned to starting position. All movement procedures were repeated 3 times and the data were used based on average value. Measurement was conducted twice, before and immediately after intervention at motion analysis laboratory.

Key secondary outcome(s))
1. Pain intensity, assessed using horizontal VAS consisting of a line, 100-mm long, with ends labeled as the extremes of pain from 'no pain' to 'pain as bad as it could be'. Patients were asked to indicate which point along the line best representing their level of pain intensity and put a mark on the line. Measurement was conducted three times; before, immediately after treatment, and at next visit after 2 days.
2. Disability level, assessed using Thai version of modified Oswestry disability questionnaire according to Sakulriprasert et al. The items included pain intensity, personal care (washing, dressing, etc), lifting, walking, sitting, standing, sleeping, social life, traveling, and employing /home making. Each item was scored on a 0-5 scale, with 0 representing no disability and 5 representing the highest disability for each function. If all items were completed, the scoring was represented with percentage by total score/total possible score that completed (maximum score 50) X 100%. Disability level measurement was conducted twice, first, before treatment as pre-treatment score. Second measurement was conducted at next visit as post-treatment score. The duration between visits is 2 days.

Completion date
17/04/2015

Eligibility

Key inclusion criteria
Patients of both genders who met the following criteria were included in the study:
1. 18-60 years old
2. Recurrent or chronic LBP at least 3 months
3. Pain severity from mild to moderate (21 to 69 mm on VAS)

Nine criteria for diagnosing of zygapophyseal joint origin according to Wilde et al were used for including the subjects. The diagnosing criterias as follows:
1. Localized unilateral back pain

2. Pain, if referred to the leg, was above the knee
3. Replication or aggravation of pain by unilateral pressure over the lumbar zygapophyseal joint or transverse process
4. No radicular features such as sign of nerve root irritation (dermatomal pain and paresthesia) and nerve root compression (dermatomal sensory loss, myotomal weakness, and loss of reflex)
5. Pain eased in flexion
6. Passive accessory movement showed reduced ROM or increased stiffness on the side of lumbar zygapophyseal joint pain.
7. Unilateral muscle spasm over the affected lumbar zygapophyseal joint
8. Pain in extension
9. Pain in 3D movement (extension, lateral flexion, and rotation) to the ipsilateral side

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Upper age limit
60 years

Sex
All

Key exclusion criteria
1. Fever
2. Pain referring below-knee
3. Women with pregnancy
4. Women within menstruation period
5. Any other spinal problems: osteomalacia, inflammatory, osteoporosis, spondylolysis, spondylolisthesis, foraminal or central stenosis, scoliosis or deformity of the spine
6. Previous back surgery
7. Disc herniation or prolapse with neurologic signs
8. Received other treatments such as injection or medication for pain reduction within 24 hours
9. Red flag for the low back region:
9.1. Back-related tumor: history of cancer, unexplained weight loss, failure of conservative therapy
9.2. Back-related infection (spinal osteomyelitis): recent infection (e.g., urinary tract or skin infection), concurrent immunosuppressive disorder
9.3. Cauda equina syndrome: urine retention or incontinence, fecal incontinence, saddle anesthesia, global or progressive weakness in the lower extremities, sensory deficits in the feet (L4, L5, and S1 areas), ankle dorsiflexion and plantar flexion weakness
9.4. Spinal fracture: history of trauma, prolonged use of steroids

Date of first enrolment

16/06/2014

Date of final enrolment
17/04/2015

Locations

Countries of recruitment
Thailand

Study participating centre
Mahidol University
Physical Therapy Center
198/2 Somdejprapinklao Road Bangyakham, Bang Phlat
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Sponsor information

Organisation
Mahidol University

ROR
https://ror.org/01znkr924

Funder(s)

Funder type
Government

Funder Name
Direktorat Jenderal Pendidikan Tinggi

Alternative Name(s)
Directorate General of Higher Education, DIKTI

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
Indonesia

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are/will be available upon request from Dr Mantana Vongsirinavarat (mantana.von@mahidol.ac.th). Type of data: raw data (characteristics of subjects; average active range of motion for flexion, extension, right and lateral flexion, and right and left rotation, visual analogue scale scores, disability scores, and cut-off frequency for X, Y, and axis). Data will be available immediately following publication, and no end date. Data can accessed by researchers who provide a methodologically sound proposal. Data can be used for to achieve aims in the approved proposal.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes