
THE EFFICACY OF MUSCLE ENERGY TECHNIQUE IN INDIVIDUALS WITH MECHANICAL NECK PAIN: A SYSTEMATIC REVIEW

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ABSTRACT

Introduction: Mechanical neck pain is a condition that includes minor strain / sprain in the muscles, ligaments, or facet joint dysfunction. **Objective:** This systematic review is aimed to find out the effectiveness of the muscle energy technique in mechanical neck pain. **Method:** The systematic review access to journal databases such as: PubMed, PEDro, and the Cochrane Library. **Results:** Based on inclusion and exclusion criteria 5 articles were used in this systematic review. The application of the muscle energy techniques was applied ranging from 1 time to 4 weeks of intervention. From the 5 reviewed studies concluded that muscle energy technique was effective in improving neck motion and function in mechanical neck pain. **Conclusion:** Based on the results of systematic review it can be concluded that the application of MET improve neck movement through The International Classification of Functioning, Disability, and Health (ICF) criteria evaluated by pain score, pain threshold, range of motion, functional performance, and muscle thickness. The appropriate articles are still limited to 5 studies, but have good to strong qualities. In addition, the application of intervention does not have the same standard.

Key words: mechanical neck pain, muscle energy technique, systematic review

EFEKTIVITAS *MUSCLE ENERGY TECHNIQUE* PADA PENDERITA *MECHANICAL NECK PAIN: SYSTEMATIC REVIEW*

ABSTRAK

Pendahuluan: *Mechanical neck pain* merupakan tipe nyeri leher yang berkaitan dengan keadaan minor sprain atau strain pada otot dan ligamen dan disertai adanya disfungsi sendi facet. **Tujuan Penelitian:** *Systematic review* ini bertujuan untuk mengetahui efektivitas *muscle energy technique* pada *mechanical neck pain*. **Metode:** Penyusunan *systematic review* menggunakan akses *database* jurnal seperti: PubMed, PEDro, dan *the Cochrane Library*. **Hasil:** Berdasarkan kriteria inklusi dan eksklusi digunakan 5 artikel dalam *systematic review* ini. Aplikasi penerapan *muscle energy technique* diaplikasikan berkisar dari 1x intervensi sampai penerapan aplikasi selama 4 minggu. Dari 5 jurnal yang dikaji menyimpulkan bahwa *muscle energy technique* efektif dalam memperbaiki gerak dan fungsi leher pada *mechanical neck pain*. **Simpulan:** Berdasarkan hasil dari *systematic review* dapat disimpulkan bahwa penerapan MET dapat memperbaiki pergerakan leher berdasarkan kriteria The International Classification of Functioning, Disability, and Health (ICF) yang dievaluasi melalui skor nyeri, ambang rangsang nyeri, kinerja fungsional, dan ketebalan otot. Jurnal yang sesuai masih terbatas pada 5 jurnal saja, tetapi memiliki kualitas dari baik sampai kuat. Selain itu, pemberian intervensi belum memiliki standar yang sama.

Kata kunci: *mechanical neck pain, muscle energy technique, systematic review*

BACKGROUND

Neck is the most mobile region in human body. Indirect cervical biomechanical changes affect the structure of the cervical spine. It causes neck pain.¹ The incidence of neck pain is around 15%. Neck pain is the second most common disease after low back pain that occurs in general population and musculoskeletal practices.² Neck pain occurs in approximately 67% of adults aged around 20-69 years.³ In Indonesia, the incidence of neck pain has increased. Approximately 16.6% of adults complain of cervical discomfort and 0.6% clinically manifesting into severe neck pain. The incidence of cervical neck pain increases with age and is more often experienced by women compared to men in a ratio of 1.67: 1.⁴

Mechanical neck pain (MNP) can originate from lesions on the zygapophyseal joint (facet joint) or the condition of muscle spasm in the cervical region. The source of symptoms of mechanical neck pain originates in the cervical, particularly in the uncovertebral joint or zygapophyseal joint. It causes the limitation of range of motion in all directions of cervical region, especially in the movements of rotation, extension, and cervical lateral flexion. Pain followed by a minor positional fault in muscle guarding of the levator scapulae, cervical paravertebral, and upper trapezius is closely related to the limitation of the range of motion of the cervical joint in mechanical neck pain.¹

Muscle energy technique is a soft tissue mobilization technique that is applied by combining isometric contractions. The application of this method is intended to restore soft tissue structure to normal and provide indirect effect on the joint that is associated with a dysfunctional muscle and can be used to normalize joint mobility in dysfunctional soft tissue structures.¹

Several studies have proven that the application of MET can reduce pain,

improve the range of motion, and reduce the degree of neck disability.^{5,6,7,8,9} However, the recommendation of application method and dosage have not been widely discussed by some previous studies.

METHOD

A. Search strategy

The systematic review access to journal databases such as: Physiotherapy Evidence Database (PEDro), MEDLINE via PubMed, and the Cochrane Controlled Trials Register in the Cochrane Library. Search strategy using keywords: 'mechanical neck pain' and 'muscle energy technique'.

B. Inclusion/exclusion criteria

Inclusion criteria include: (1) Journal articles with randomized controlled trial (RCT) research designs, (2) Article must be in English, (3) Articles published in the last 10 years (May 2009 - May 2019). While the exclusion criteria include: (1) If there is the same article, then other articles are excluded, (2) case reports, abstracts, conference proceedings, or thesis.

C. Study selection

Three reviewers (M.H.S.N., N.K.A.J.A and L.P.G.K.S) conducted screening and identification through a journal database, such as PEDro, Pubmed, and Cochrane library. The reviewers then screened the full text and adjust to the inclusion and exclusion criteria.

D. Study quality assessment

In assessing the quality of studies, reviewers use the Standard Quality Assessment Criteria for Evaluating Primary Research Paper from a Variety of Fields. This criterion consists of a 14-item assessment checklist in which points were awarded to each criterion (no=0, partial=1, and yes=2). This criterion is a validated standard.¹⁰ Article quality assessment was assessed by dividing the total assessment score by 28 then categorized into: limited (<50%), adequate (50% - 69%), good (70% - 80%), or strong (score of >80%).

Studied with percentage scores under 50% were excluded from this review.¹¹

E. Data extraction

Data were extracted by summarizing data on description of participants, intervention, control/comparison, outcome measure, results, and quality rating of the study.

A. Study selection

The initial search in 3 databases found a total of 32 articles. Then the selection using inclusion and exclusion criteria obtained 10 articles. The same article was then excluded. The total articles used in this study amounted to 5 articles. Explanation regarding study selection, described in Figure 1.

RESULTS

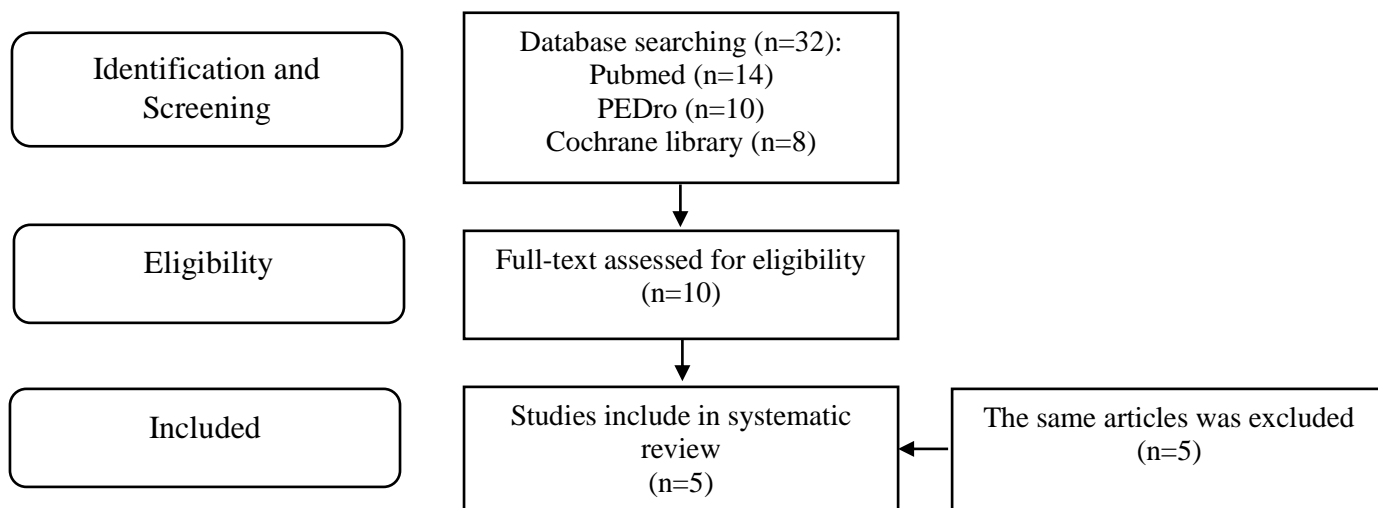


Figure 1. A flow chart of search strategy

B. Methodological quality and risk of bias of reviewed studies

After assessing the quality of the study, there is no article was excluded because they had a score of <50%. The

articles obtained have a strong category for 3 and good for 2 studies. Explanation regarding the quality assessment of journals, described in table 1.

Table 1. Methodological quality of included studies

Article	Items on standard quality assessment checklist													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nagrle <i>et al.</i> , 2010	+	+	+	+	+	+	-	+	+	+	+	±	+	+
Oliveira-Campelo <i>et al.</i> , 2013	+	+	+	+	+	+	-	+	+	+	±	+	+	+
Phadke <i>et al.</i> , 2016	+	+	+	+	+	-	-	+	+	+	±	±	+	+
Sadria <i>et al.</i> , 2017	+	+	+	+	+	±	-	+	+	+	±	±	+	+
Kashyap <i>et al.</i> , 2018	+	+	+	+	+	-	-	+	±	+	±	+	+	+

+ = yes; - = no; ± = partial

C. Study characteristics

The 5 reviewed studies had a total of 393 participants. The age of participants ranged between 18-50 years old. The

sample sizes of studies ranged from 15 to 37 subjects. The characteristics of the summary of the study results used in this review are summarized in table 2.

Table 2. Characteristics of reviewed studies describing the efficacy of muscle energy technique

Author	Sample	Intervention	Control/comparison	Outcome measures	Results	Quality rating
Nagrale et al., 2010 ⁽⁵⁾	N = 60 Age range: 19 – 38.	Integrated Neuromuscular Inhibition Technique/INIT (consist of MET, strain-counterstrain, and ischemic compression/IC) (n=30) Dosage: 3 session per week for 4 weeks.	Muscle energy technique/MET (n=30)	- Outcome measure was assessed at pre-treatment, 2 weeks after treatment, and 4 weeks after treatment. - Neck pain: VAS. Functional performance: NDI. Cervical ROM: CROM goniometer.	The results showed significantly improvements in pain, lateral flexion ROM of cervical, and neck disability were detected in the INIT group.	Strong 25/28 89,28%
Oliveira-Campelo et al., 2013 ⁽⁶⁾	N = 164 Age range: 18 – 20	Muscle Energy Technique (MET) (n=32) IC (n=37) Passive stretching (PS) (n=29) Dosage: 1 session	Placebo (n=31) Wait and see group (n=35)	- Outcome measure was assessed at pre-treatment, immediately, 24 hours after the intervention, and 1 week later. - Cervical spine range of movement: cervical active range of motion (CAROM) Pressure pain sensitivity: algometer dan VAS.	MET group had similar result to the PS group, but with a lower immediate effect size. Only IC maintained the effect size after 24 hours and 1 week later.	Strong 25/28 89,28%
Phadke et	N = 60	MET (n=30)	PS (n=30)	- Outcome	MET and PS	Good

al., 2016 (7)	Age range: 18 – 50	Dosage: 1 session per day for 6 days		measure was assessed at pre- treatment and on the day 6.	had shown a significant improvement in both NDI and VAS score. However, MET showed a better improvement than PS group.	22/28 78,57%
Sadria et al., 2017 (8)	N = 64 Age range: 18 – 50.	Muscle energy technique (n=30) Dosage: 1 session	Active Release Technique (ART) (n=30)	- Outcome measure was assessed at pre- treatment and 24 hours after intervention.	Both manual techniques of MET and ART can reduce the symptoms of latent trigger points equally.	Strong 23/28 82,14%
				- Range of motion: active range of movement cervical lateral flexion Neck pain: VAS Thickness of upper trapezius muscle: algometer		
Kashyap et al., 2018 (9)	N = 45 Age range: 18 – 30	Manual pressure release + postural advice + active exercise + conventional exercise (isometric neck exercise, stretching, gentle	Postural advice + active exercises +conventio nal exercise (n=15)	- Outcome measure was assessed at pre- treatment (day 0), day 1, day 5 post- intervention,	There were significant improvement in all outcome measures at days 1 and 5 postinterventi on and at days 10 and 15	Good 22/28 78,57%

conditioning exercises for neck and shoulder girdle) (n=15)	10 and 15 days follow-up.	during the follow-up for all groups. The between group analyses confirmed nonsignificant differences for all variables.
Muscle energy technique+ postural advice + active exercise + conventional exercise (n=15)	- Neck pain: Visual Analog Scale (VAS) Muscle tenderness: pressure pain threshold Functional performance: Neck Disability Index (NDI) Range of neck rotation: standardized measuring tape	
Dosage: conventional exercise was carried out independently at home for 15 days		

DISCUSSION

The application of the muscle energy techniques was applied ranging from 1 time to 4 weeks of intervention. From the 5 reviewed articles concluded that muscle energy technique was effective in improving neck motion and function in mechanical neck pain. Evaluated

measurements included: pain, range of motion, neck disability, and the thickness of the upper trapezius muscle. Table 3 describes the outcome measure used in this study to evaluate the limitations of body function and movement in mechanical neck pain based on The International Classification of Functioning, Disability and Health (ICF) criteria.

Table 3. Outcome measure used in the study

Study	Treatment Outcomes				
	Pain	Pain Threshold	Range of motion	Functional performance	Muscle thickness
Nagrle <i>et al.</i> , 2010 ⁽⁵⁾	√		√	√	
Oliveira-Campelo <i>et al.</i> , 2013 ⁽⁶⁾		√	√		
Phadke <i>et al.</i> , 2016 ⁽⁷⁾	√			√	
Sadria <i>et al.</i> , 2017 ⁽⁸⁾	√		√		√
Kashyap, <i>et al.</i> , 2018 ⁽⁹⁾	√	√	√	√	

MNP originates from lesions on the zygapophyseal joint (facet joint) or the condition of muscle spasm in the cervical region. MET is effective in increasing the range of motion due to the presence of post isometric relaxation (PIR) and RI (reciprocal inhibition) mechanisms.¹²

PIR refers to the assumed effect of reduced muscle tone after isometric contraction. Hypertonia muscle will be stretched of the new range of motion. The therapist give the resistance from the opposite direction and the patient is asked to do isometric contractions by resisting the therapist's force for 5-10 seconds. After isometric contractions, the muscles will be stretched gently to increase muscle flexibility to the new range of motion. This procedure could be repeated 2 or 3 times.¹²

In contrast to PIR, RI involves the physiological response of the antagonistic muscle that has been contracted isometrically. When muscles are contracted isometrically, the antagonist muscles will be blocked, and experience a decrease in muscle tone. The application of RI is done by utilizing antagonist muscle contractions. Muscles that experience lesions are positioned in the middle of the total degree of range of motion. The patient is asked to contract in a limited direction while the therapist gives resistance in the opposite direction (isometric) or even allows movement toward it (isotonic). This is followed by relaxation of the patient and also exhalation. At the same time, therapists passively stretch the muscle in a limited direction with new range of motion. This procedure is repeated 3-5 times.¹²

Based on the systematic review, it was found that the application of MET on mechanical neck pain can reduce pain evaluated through visual analogue scale. Fryer and Fossum at (Nagrle, et al., 2010) stated that the sequence of muscle and joint mechanoreceptor activation stimulates the

local somatic efferents. It turn leads to sympatho-excitation and activation of the periaqueductal gray matter, which play role in the descending modulation of pain.⁵ Frontera at (Phadke, et al., 2016) stated that the reduction in pain could be due to the inhibitory effects of golgi tendon organs (GTO), which reduces the motor neuron discharges. It is causing relaxation of the musculotendinous unit by resetting its resting length and pacinian corpuscle modification. These reflexes allow relaxation in musculotendinous and decreased pain perception.⁷

In other words (Sadria, et al., 2017) summarize that the application of MET could stretch and increase the myofascial tissue extensibility and affect the viscoelastic tissue properties and mediate the changes of extracellular fluid dynamics and fibroblast mechano-transduction.⁸ Because of this mechanism, there is also an improvement of the range of motion and a reduction of the muscle spasm. Therefore, there is improvement in neck disability.^{5,6,7,8,9}

CONCLUSION

It can be concluded that the application of MET improve neck movement through The International Classification of Functioning, Disability, and Health (ICF) criteria evaluated by pain score, pain threshold, range of motion, functional performance, and muscle thickness.

RESEARCH LIMITATIONS

The appropriate articles are still limited to 5 studies, but have good to strong qualities. In addition, the application of intervention does not have the same standard.

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