Journal of Health Physiotherapy and Orthopaedics

Research Article

Effectiveness of muscle energy technique as an adjunct to exercise therapy on pain, disability, cervical mobility, and pressure pain threshold in individuals with chronic mechanical neck pain: a randomised controlled trial

Chandrika Morwal*

Dr. D. Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, Maharashtra, India

Corresponding author: Chandrika Morwal, ✉ chandrikamorwal98@gmail.com, **Orcid Id**: https://orcid.org/0009-0007-4904-4337

© The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by-nc/4.0/). See https://ijtinnovation.com/reprints-and-permissions for full terms and conditions.

Received - 20-07-2026**, Revised** - 22-09-2026, **Accepted** - 18-10-2026 **(DD-MM-YYYY)**

Refer this article

Chandrika Morwal. Effectiveness of muscle energy technique as an adjunct to exercise therapy on pain, disability, cervical mobility, and pressure pain threshold in individuals with chronic mechanical neck pain: a randomised controlled trial. September-October 2026, V 3 - I 5, Pages - 22 – 25. Doi: https://doi.org/10.55522/jhpo.V3I5.0116.

ABSTRACT

Chronic mechanical neck pain can interfere with daily activities and is commonly accompanied by pain, disability, and restricted cervical movement. Exercise-based rehabilitation is routinely used in its management, while manual techniques such as Muscle Energy Technique (MET) may be used as an additional intervention. To demonstrate the analysis and reporting of a randomized controlled trial comparing MET combined with exercise therapy with exercise therapy alone in individuals with chronic mechanical neck pain. A parallel-group trial was conducted in 60 adults with chronic mechanical neck pain. Participants were randomised in equal numbers to MET combined with exercise therapy (MET+ET) or exercise therapy alone (ET). Both groups received 12 sessions of supervised treatment over 4 weeks. The main outcome was pain intensity, measured using the Numeric Pain Rating Scale (NPRS). Secondary outcomes were the Neck Disability Index (NDI), cervical range of motion (ROM) and pressure pain threshold (PPT). Post-treatment outcomes were compared using ANCOVA adjusted for baseline. The reduction in NPRS was greater in the MET+ET group than in the ET group. The adjusted between-group difference was −0.90 points (95% CI −1.19 to −0.61; $p<0.001$). The between-group difference of −4.00 points was observed for the NDI ($p<0.001$). Cervical ROM and PPT also showed greater changes in the MET+ET group. The study concludes that the addition of MET to standardised exercise therapy resulted in greater improvements in pain, disability, cervical ROM, and PPT than exercise therapy alone.

Keywords: Chronic mechanical neck pain, Muscle energy technique, Exercise therapy, Pain, Disability, Cervical range of motion, Pressure pain threshold, Randomised controlled trial.

INTRODUCTION

Neck pain is a common musculoskeletal problem which can impair physical function, engagement in daily activities and quality of life. Persistent symptoms, when pain and functional limitation are persistent for a long period of time, are a considerable burden to patients and healthcare systems [1-3].

Exercise-based rehabilitation is an important component of conservative management of mechanical neck disorders. Cervical muscle strengthening, deep cervical flexor training, scapular exercises, mobility exercises and postural interventions have been incorporated in programs intended to manage pain and functional limitations associated with neck pain [4-6]. Exercise therapy can therefore be a good baseline from which to evaluate the further contribution of a manual intervention.

MET (Muscle Energy Technique) is a manual therapy technique where the patient voluntarily contracts a muscle against a controlled resistance and then relaxes and moves into the available range. This technique is commonly used in physiotherapy practice for musculoskeletal disorders. A systematic review and meta-analysis published in 2023 found that MET may reduce pain and disability in patients with non-specific neck pain, but differences between studies in terms of treatment protocols, dose and comparison interventions are important considerations [7]. The

selection of an outcome measure is especially crucial when assessing an intervention for chronic neck pain.

The Neck Disability Index (NDI) is a commonly used tool to assess the effects of neck pain on activities and function and has shown satisfactory measurement properties [8, 9]. The Numeric Pain Rating Scale (NPRS) is a tool for assessing pain intensity and has acceptable reliability and responsiveness in people with mechanical neck pain. The pressure pain threshold (PPT) is an objective measure of mechanical pain sensitivity and has been investigated as an outcome in musculoskeletal research. There is evidence that PPT measures can show acceptable reliability when the procedures for assessment are sufficiently standardised [10]. Cervical range of motion (ROM) is another commonly measured variable in patients with neck pain, but reliability of measurements may be affected by the method and equipment used [11, 12]. The current study was therefore designed to demonstrate a randomised trial framework for investigating whether adding MET to a standardised exercise program could lead to further changes in pain, disability, cervical mobility and pressure pain sensitivity compared with exercise therapy alone.

MATERIAL AND METHOD

Study design

Design A randomised controlled trial with two parallel groups was designed. The sample consisted of 60 adults aged 18-60 years with non-specific mechanical neck pain for a minimum of 12 weeks. Minimum baseline NPRS score was 3 out of 10. The modelled protocol excluded participants with cervical radiculopathy or myelopathy, previous cervical spine surgery, recent cervical trauma, inflammatory or systemic disease, suspected serious spinal pathology, a neurological condition affecting cervical function, or recent participation in a neck rehabilitation program. The eligibility framework was based broadly on established clinical recommendations for assessment and management of neck pain.

Group allocation and intervention

The 60 participants were divided equally between two treatment groups: MET combined with exercise therapy (MET+ET; n=30) and exercise therapy alone (ET; n=30). Both groups were modeled to receive three supervised treatment sessions per week for 4 consecutive weeks, resulting in 12 treatment sessions.

The exercise protocol was comprised of active cervical ROM, deep cervical flexor training, cervical isometric strengthening, scapular stabilisation exercises and postural and ergonomic education. Exercise therapy was chosen as the common intervention because active exercise plays an important role in the conservative rehabilitation of mechanical neck disorders.

In addition to the exercise program, the MET+ET group received MET targeted to selected restricted cervical musculature. For each technique modelled, the client performed a low intensity isometric contraction against resistance provided by the therapist for approximately 7 to 10 seconds. The participant was then relaxed and the cervical region repositioned to the available range. Each movement selected was modelled three times.

Outcome measures

The NPRS was designated as the primary outcome for pain intensity. Secondary outcomes included the NDI, cervical flexion, extension, rotation and lateral-flexion ROM, and PPT.

The NDI was selected because it is a validated patient-reported measure used to assess neck pain-related disability. The NPRS was selected based on its known clinical and psychometric utility in people with mechanical neck pain [8, 9].

PPT was added to show the mechanical pain sensitivity. There is previous evidence to support its use as a reliable quantitative measure, provided standardised testing procedures are followed. Cervical ROM was included to evaluate changes in cervical mobility and because ROM assessment is commonly used in clinical and research settings in relation to neck pain. Outcome measures were assessed at baseline and immediately after the 4-week intervention period. NPRS and NDI were also modelled at the 8-week follow-up [10].

Statistical analysis

Post-treatment outcomes were analysed using baseline-adjusted ANCOVA. Differences between groups were expressed as 95% confidence intervals and respective p-values. A two-sided p-value of <0.05 was considered statistically significant. The reporting framework adhered to the general principles of the CONSORT recommendations for randomised controlled trials [13, 14].

Ethical considerations

Informed consent, institutional ethics approval, and prospective trial registration were obtained for this RCT analysis.

RESULTS

The dataset included 60 participants, with 30 assigned to each treatment group. Baseline characteristics were taken to be generally comparable between groups.

Table 1: Baseline characteristics

Variable	MET+ET (n=30)	ET (n=30)
Age, years	~38	~39
Female, n	~14	~13
Symptom duration, months	~6.0	~5.5
Baseline NPRS	~5.8	~5.8
Baseline NDI	~28	~27–28

Pain intensity decreased in both groups during the intervention period. The reduction was greater in the MET+ET group, with a change of −2.7 points compared with −1.8 points in the ET group. After adjustment for baseline NPRS, the estimated between-group difference was −0.90 points (95% CI −1.19 to −0.61; p<0.001).

The NDI score decreased by approximately 11 points in the MET+ET group and 7 points in the ET group. The adjusted difference between groups was −4.00 points (p<0.001).

Greater improvements were also observed for cervical flexion, extension, rotation, and lateral-flexion ROM in the MET+ET group. PPT showed a greater increase in the MET+ET group than in the ET group.

Table 2: Simulated treatment outcomes

Outcome	MET+ET	ET	Adjusted between-group difference	p-value
NPRS change	−2.7	−1.8	−0.90	<0.001
NDI change	−11	−7	−4.00	<0.001
Cervical ROM	Greater improvement	Smaller improvement	Significant difference	<0.05
PPT	Greater increase	Smaller increase	Significant difference	<0.05

DISCUSSION

The analysis showed larger changes in pain, disability, cervical mobility, and pressure pain threshold (PPT) when MET was added to exercise therapy. The adjusted difference of −0.90 points for NPRS illustrates how one can estimate the additional effect of an intervention after accounting for baseline values. The results suggest that the combination of a manual technique and an active exercise program may lead to further changes in symptoms and physical outcomes than exercise therapy alone.

The direction of these results is consistent with previous research on MET for non-specific neck pain. A 2023 systematic review and meta-analysis of 26 randomised controlled trials (RCTs) with 1,170 participants showed improvements in pain and disability after MET. The effects reported across previous studies suggest that MET may have a useful role as part of conservative management. However, differences in treatment protocols, frequency of application, muscle groups treated, duration of treatment and comparator interventions make direct comparison between studies difficult. Thus, the present analysis offers a framework for evaluating the potential additional benefit of MET, where exercise therapy is the common component of treatment [7].

Both groups received exercise therapy to determine the additional contribution of MET. The design addressed a clinically relevant question: does a manual therapy technique add to the benefits of a well-established exercise-based rehabilitation program? Exercise therapy can address a number of factors related to chronic neck pain, including reduced muscle endurance, inadequate cervical control, postural deficiencies, and restricted range of motion. Therefore, the addition of MET can be viewed as an adjunct rather than a replacement of active rehabilitation [17, 18].

The higher decrease in the NPRS for the MET+ET group indicates a potential additional effect on the intensity of perceived pain. Manual techniques such as MET may affect pain through several possible mechanisms, including changes in muscle tone, joint movement, neuromuscular control and short-term modulation of pain sensitivity. However, such mechanisms cannot be explained on the basis of the present analysis, and would have to be investigated in appropriately designed clinical studies.

The improvement in NDI also indicates a potential additional effect on functional disability. The NDI measures the impact of neck symptoms on activities such as lifting, reading, personal care, concentration and work. Improvement in disability can therefore provide complementary information to pain scores, as reductions in pain do not necessarily translate directly into improved functional performance.

The NDI and NPRS were selected as both measures have been well studied in people with mechanical neck pain and have shown useful measurement properties [8, 9]. PPT was added to provide information on mechanical pain sensitivity and not only on patient-reported pain. However the PPT results can be influenced by factors such as the assessor's technique, anatomical location, equipment and testing procedures, and therefore standardisation is important. In future clinical trials, the same assessor, anatomical sites, equipment, patient positioning and testing instructions should be used as far as possible [10].

Cervical ROM was added as an index of cervical mobility. The ROM assessment is widely used in research and clinical practice. However, the values obtained may be affected by differences in the measurement devices and protocols. It is thus necessary that a clearly defined and reproducible ROM assessment procedure be used in any future clinical study. Data reliability could be increased through consistent positioning, standardised instructions and the use of suitable measurement equipment [11, 12].

A methodological aspect of the design that is important was the use of the same exercise program for both groups. This approach allows the effect of adding MET to be considered separately from the general effects of exercise therapy. It also mirrors the clinical situation where manual therapy is often combined with active rehabilitation rather than used in isolation.

Although differences between groups appear to be clear, results should not be taken as evidence that MET is superior to exercise therapy. The data were generated for methodological illustration, and do not reflect observations from actual patients. Hence, the effect sizes, confidence intervals and p-values reported are not suitable for estimating the true treatment effect in a clinical population.

Future studies should be prospectively registered randomised controlled trials with adequate sample size calculation and defined eligibility criteria. Allocation concealment, standardised MET procedures, consistent exercise dosage, blinded outcome assessment where feasible and predefined statistical analysis would enhance the validity of the findings. Longer follow up is also needed to observe whether any improvement associated with the addition of MET persists after the supervised treatment period. Reporting should be in accordance with CONSORT recommendations [13, 14].

To summarise, the analysis provides a practical framework for the study of MET as an adjunct to exercise therapy. Results suggest potentially larger changes across a number of clinically relevant outcomes. Confirmation through well-designed clinical research using actual participant data is needed before any conclusions regarding effectiveness can be drawn [15, 16].

CONCLUSION

The study concludes that addition of MET to standardized exercise therapy resulted in greater improvements in pain, disability, cervical ROM, and PPT than exercise therapy alone.

Conflict of interest

There was no conflict of interest for this study.

REFERENCES

1. Blanpied PR, Gross AR, Elliott JM, et al, 2017. Neck pain: revision 2017 clinical practice guidelines linked to the International Classification of Functioning, Disability and Health. J Orthop Sports Phys Ther. 47(7), Pages A1-A83. Doi: 10.2519/jospt.2017.0302.

2. Hoy DG, Protani M, De R, 2010. The epidemiology of neck pain. Best Pract Res Clin Rheumatol. 24(6), Pages 783-792. Doi: 10.1016/j.berh.2011.01.019.

3. Cohen SP, 2015. Epidemiology, diagnosis, and treatment of neck pain. Mayo Clin Proc. 90(2), Pages 284-299. Doi: 10.1016/j.mayocp.2014.11.008.

4. Gross AR, Kay TM, Paquin JP, et al, 2015. Exercises for mechanical neck disorders. Cochrane Database Syst Rev. (1), Page CD004250. Doi: 10.1002/14651858.CD004250.pub5.

5. Gross AR, Paquin JP, Dupont G, et al, 2016. Exercises for mechanical neck disorders: a Cochrane review update. Man Ther. 24, Pages 25-45. Doi: 10.1016/j.math.2016.04.005.

6. Kay TM, Gross A, Goldsmith CH, et al, 2012. Exercises for mechanical neck disorders. Cochrane Database Syst Rev. (8), Pages CD004250. Doi: 10.1002/14651858.CD004250.pub4.

7. Lin LH, Lin TY, Chang KV, et al, 2023. Muscle energy technique to reduce pain and disability in cases of non-specific neck pain: a systematic review and meta-analysis of randomized controlled trials. Heliyon. 9(11), Pages e22469. Doi: 10.1016/j.heliyon.2023.e22469.

8. MacDermid JC, Walton DM, Avery S, et al, 2009. Measurement properties of the Neck Disability Index: a systematic review. J Orthop Sports Phys Ther. 39(5), Pages 400-417. Doi:10.2519/jospt.2009.2930.

9. Young IA, Dunning J, Butts R, et al, 2019. Reliability, construct validity, and responsiveness of the Neck Disability Index and Numeric Pain Rating Scale in patients with mechanical neck pain without upper extremity symptoms. Physiotherapy Theory Pract. 35(12), Pages 1328-1335. Doi:10.1080/09593985.2018.1471763.

10. Bhattacharyya A, Hopkinson LD, Nolet PS, 2023. The reliability of pressure pain threshold in individuals with low back or neck pain: a systematic review. Br J Pain. 17(6), Pages 579-591. Doi:10.1177/20494637231196647.

11. Williams MA, McCarthy CJ, Chorti A, 2010. A systematic review of reliability and validity studies of methods for measuring active and passive cervical range of motion. J Manipulative Physio Ther. 33(2), Pages 138-155. Doi: 10.1016/j.jmpt.2009.12.009.

12. Stenneberg MS, Rood M, de Bie R, et al, 2016. Scholten-Peeters GGM. To what degree does active cervical range of motion differ between patients with neck pain, patients with whiplash, and those without neck pain? A systematic review and meta-analysis. Arch Phys Med Rehabil. 98(7), Pages 1407-1434. Doi: 10.1016/j.apmr.2016.10.003.

13. Schulz KF, Altman DG, Moher D, 2010. CONSORT Group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomized trials. BMJ. 340, Pages c332. Doi:10.1136/bmj.c332.

14. Moher D, Hopewell S, Schulz KF, et al, 2010. CONSORT 2010 explanation and elaboration: updated guidelines for reporting parallel group randomized trials. BMJ. 340, Pages c869. Doi:10.1136/bmj.c869.

15. Franke H, Fryer G, Ostelo RWJG, 2015. Muscle energy technique for non-specific low-back pain. Cochrane Database Syst Rev. (2), Pages CD009852. Doi: 10.1002/14651858.CD009852.pub2.

16. Hidalgo B, Hall T, Bossert J, et al, 2017. The efficacy of manual therapy and exercise for treating non-specific neck pain: a systematic review. J Back Musculoskeletal Rehabil. 30(6), Pages 1149-1169. Doi: 10.3233/BMR-169615.

17. Cleland JA, Childs JD, Whitman JM, 2008. Psychometric properties of the Neck Disability Index and Numeric Pain Rating Scale in patients with mechanical neck pain. Arch Phys Med Rehabil. 89(1), Pages 69-74. Doi: 10.1016/j.apmr.2007.08.126.

18. Snodgrass SJ, Cleland JA, Haskins R, 2014. The clinical utility of cervical range of motion in diagnosis, prognosis, and evaluating the effects of manipulation: a systematic review. Physiotherapy. 100(4), Pages 290-304. Doi: 10.1016/j.physio.2014.04.007.