Effectiveness of Muscle Energy Technique with and without Strain Counter Strain Technique in Individuals with Non-Specific Neck Pain - A Pilot Study from Aurangabad, India

Karishma Anurag Kapur¹, Sunil Gopal Rao Harsulkar²

^{1,2} Department of Physiotherapy, MGM Institute of Health Sciences, Aurangabad, Maharashtra, India.

ABSTRACT

BACKGROUND

Evidence till date indicates high incidence of neck pain, and soft tissue techniques [muscle energy technique (MET), strain counter strain (SCS)] have proven to be effective for non-specific neck pain (NSNP). However, their comparative effect is yet to be proven, hence the present study attempted to investigate the comparative effectiveness of MET with SCS techniques in individuals with NSNP.

METHODS

Total 10 participants diagnosed with NSNP were included in the study. They were allocated into two groups utilizing convenient sampling. Group A received MET with SCS technique and Group B received MET with conventional physiotherapy. The interventions were given for 2 weeks, 3 sessions per week for 45 minutes. The outcome measures used in the study were numeric pain rating scale (NPRS), neck disability index (NDI), range of motion (ROM) which were assessed before the intervention immediately after the first session and at 1st week and end of 2nd week.

RESULTS

Intragroup comparison found to be significantly reduced in terms of pain and neck disability index and improvement in cervical range of motion ($P = < 0.05$). However intergroup comparisons showed significant difference in Group A only at the end of 2nd week of intervention ($P = < 0.05$), but the results were not significant immediately and at the 1st week of intervention ($P = > 0.05$).

CONCLUSIONS

The study concluded that MET with SCS technique is more effective in reducing pain, neck disability and improving cervical range of motion.

KEY WORDS

MET, SCS, NSNP

Corresponding Author:

*Dr. Karishma Kapur,
1/3/12, J. E. S College Road,
KALASH Niwas, Jalna,
Maharashtra, India.
E-mail: kapurkarishma49@gmail.com*

DOI: 10.14260/jemds/2021/505

How to Cite This Article:

Kapur KA, Harsulkar SG. Effectiveness of muscle energy technique with and without strain counter strain technique in individuals with non-specific neck pain - a pilot study from Aurangabad, India. J Evolution Med Dent Sci 2021;10(31):2470-2475, DOI: 10.14260/jemds/2021/505

*Submission 25-03-2021,
Peer Review 29-05-2021,
Acceptance 05-06-2021,
Published 02-08-2021.*

Copyright © 2021 Karishma Anurag Kapur et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

BACKGROUND

According to the International Association for the study of pain (IASP) range of musculoskeletal disorders are causative factors for neck disability amongst all the neck pain which is the fourth cause of disability.¹ It is the most commonly found musculoskeletal disorder in today's generation of automation. It usually arises insidiously and is characterized by pain exacerbated by cervical spine positions or movements, and is the second most common musculoskeletal complaint.² According to the Cochrane review available "Non-specific neck pain can be defined as simple (non-specific) neck pain without specific underlying disease causing the pain".³ A study done by Binder A. reports time bound distribution of neck pain. The symptoms may be classified as acute if symptoms exist more than 4 weeks' duration, sub-acute if it lasts between 1 - 4 months duration or chronic more than 4 months duration. Neck pain has some common symptoms like reduced range of motion, neck stiffness, dull aching pain, and trigger points reduce the quality of life.⁴

According to the international literature available there is lot of variation observed in the prevalence studies of nonspecific neck pain. It is appraised that 22 % to 70 % of the population will have non specific neck pain at some point in their lives likewise, it has also been estimated that there is inclination in the number of individuals with nonspecific neck pain.⁵ At some random time, 10 % to 20 % of the population reports neck problems. The course of neck pain is frequently described by exacerbations, will progress into manifestations enduring for more than 6 months,⁶ specifically, ceaseless non specific neck pain (CNSNP) (i.e., constant neck pain with no specific ailment identified as the basic reason for identifying the source of symptoms). Prevalence of non specific neck pain increments with age and is generally regular in women.⁷

According to literature available the signs and symptoms of the nonspecific neck pain mimics the symptoms of Grade I - II whiplash associated disorders.⁸ The natural history of pain with nonspecific neck pain resolves within weeks or days. Till date moderate level of evidence is available for the diagnosis of nonspecific neck pain because it can be complicated by signs and symptoms of cervical spondylosis syndrome.^{9,10}

There is certain literature available which has hypothesized that the trigger points are caused due to the overloading of the muscle which further leads to the muscle shortening and adds to the symptoms produced.¹¹ The area of the muscle under tension receives less oxygen supply, nutrition and accumulates metabolic waste which finally results in the altered soft tissue which can be one of the contributing causes of non-specific neck pain, and it has been proven that the muscle dysfunction and impairment are the major contributors of the mechanical neck pain which is often related with the reduced muscle strength and endurance that have been seen in sufferers with neck pain.^{12,13}

The management of non-specific neck pain incorporates manual and non-manual interventions.¹⁴ Manual approaches include muscle energy technique, Strain counter strain technique, myofascial release, proprioceptive neuromuscular facilitation, and ischemic compression.¹⁵ In spite of the developing number of studies evaluating the efficacy of the above interventions, considerable irregularities keep on existing, to a limited extent, due to insufficient evidence with

respect to ideal intervention, the best mode for conveying the administration, and the differential results of various kinds of activity on NSNP is yet to be administered.^{16,17}

Recent studies investigated the relationship between MET and SCS technique in individuals with low back pain. However, there is hardly any evidence of MET and SCS in the management of NSNP.

The objectives of the present study were to investigate the effectiveness of MET, Strain counter strain technique and conventional physiotherapy in the management of NSNP individuals in terms of relief of pain and improvement of functions and cervical range of motion (CROM).

METHODS

It is a prospective comparative study and a total of 10 participants (as per the convenience) between the age group of 30 and 50 years were included in the study as per the inclusion and exclusion criteria. The primary objective of the study effectiveness of MET with SCS technique in participants with nonspecific neck pain and secondary objective were to investigate the effectiveness of MET with Strain Counter Strain technique and MET with conventional physiotherapy treatment in improving functions in participants with nonspecific neck pain. Study was done in MGM Physiotherapy department, Aurangabad. The intervention was given for 2 weeks, 3 sessions per week for 45 mins each session. The study was approved by the institutional ethics committee on 11 / Dec / 2019 and the participants were briefed about the assessment and treatment protocol and the written informed consent form was obtained from all the participants. The duration of study was two months after the ethical approval study ended on 6 / March / 2020. The participants were allocated into two groups based on convenient sampling, the two groups were Group A: MET with SCS technique, Group B: MET with conventional physiotherapy. Pain, intensity, range of motion, and level of disability were assessed before the intervention immediately after the first session, at the interval of 1st week and at the end of 2nd week. Considering the Pilot study design and smaller sample size the results of present study could not be generalised.

Inclusion Criteria

- Participants between the age of 30 and 50 years who were willing to participate
- Individuals with clinical diagnosis of nonspecific neck pain
- Both males and females were included in the study.

Exclusion Criteria

- Participants with cervical spondylosis syndrome
- Participants with associated low back pain
- Participants with vertebrobasilar Insufficiency
- Participants with recent cervical fractures
- Psychologically compromised patients
- Participants with Prolapsed Intervertebral Disc

Procedure

Procedure for Muscle Energy Technique

Muscle Energy technique was administered as described by Lewit.¹⁹

Technique

- The hypertonic muscle is taken to length just short of pain or point to which resistance is just noted
- A submaximal [10 % - 20 %] contraction of the hypertonic muscle is performed away from the barrier between 5 and 10 seconds and the therapist applies resistance in opposite direction the patient should inhale during the effort

After the isometric contraction patient is asked to relax and exhale, while doing so gentle stretch is applied to take up the slack till the new barrier. Starting from this new barrier the procedure is repeated two or three times.

Procedure for Strain Counter Strain Technique

Strain counter strain technique was administered as described by Lawrence H. Jones, D. O.²⁰ The basic steps required to perform strain - counterstrain (SCS) in any region of the body are as follows -

1. Find a TP.
2. Assess the tenderness using a pain scale.
3. Passively and gently place the patient in a position of comfort that results in the greatest reduction of tenderness at the TP. Approximate the position first, then fine tune through small arcs of movement. Aim to achieve at least 70 % tenderness reduction, with the goal of 100 %.
4. Maintain the position for 90 seconds while continuing to monitor the patient's TP.
5. Passively return the patient to a neutral position.
6. Retest for tenderness at the TP.

Outcome Measures

- Numerical pain rating scale - the NPRS was used to measure the intensity of pain before the intervention, immediately after the first session at the end of 2nd week. exhibits moderate reliability of 0.67.
- Range of motion of cervical spine - The range of motion was assessed using universal goniometer before the intervention immediately after the first session and at the end of 2nd week of intervention. It exhibited excellent reliability of 0.98
- Neck disability index - The level of disability was assessed using neck disability index before the intervention, immediately after the first session and at the end of 2nd week the highest reported reliability was 0.88

Figure 1. Strain Counter Strain Upper Trapezius

Figure 2. Muscle Energy Technique for Upper Trapezius

Statistical Analysis

Statistical analysis was done by using descriptive statistics for characteristics and inferential statistics for testing a hypotheses and test of significance such as chi square test was used to confirm normal distribution of population and, student's paired and unpaired t test for inter and intragroup

comparisons were used in the present study respectively, and $P < 0.05$ was considered as level of significance. The software used for the analysis was SPSS 24.0 version.

RESULTS

The study was done to investigate the comparative effectiveness of muscle energy technique with strain counter strain technique on pain, active cervical range of motion (ACROM) and neck disability index (NDI) in individuals with nonspecific neck pain. For this purpose the data was collected by principal investigator immediately after the intervention, at the first week and completion of second week for all the outcome measures.

Demographics

A total of ten participants with nonspecific neck pain were screened for the study as per the inclusion and exclusion criteria. MET with strain counter strain group had 5 participants with mean age of 40.60 ± 7.76 years and Body Mass Index (BMI) mean was 26.05 ± 2.48 kg / m². MET without strain counter strain group also had 5 participants with mean age of 44.60 ± 6.61 years and BMI mean was 25.92 ± 1.63 kg / m². The mean difference of all data was statistically not significant ($P > 0.05$). Baseline demographic and clinical data was comparable.

Pain Relief

The intragroup comparisons showed significant difference immediately after the intervention, after 1 week and at the end of 2nd week ($P < 0.05$), whereas there was no significant difference in the inter group comparison on pain relief ($P > 0.05$).

Neck Disability Index (NDI)

Intragroup comparisons of NDI score assessed after 1 and 2 weeks of intervention showed statistically significant improvement ($P < 0.001$). The inter group comparison also showed statistically significant improvement ($P < 0.001$).

Active Cervical Range of Motion (ACROM)

Active cervical flexion, extension, side flexion and rotations were measured with the help of universal goniometer. The ranges were measured immediately after the intervention, after 1 week and at the end of second week. Intergroup comparisons at the end of second week showed statistically significant improvement in all the above ranges. Intragroup comparison showed that flexion, extension, left side flexion, right side flexion range of motion results were more significant on 2nd week of intervention, whereas the results were not significant on immediate day 1 and post 1st week of intervention. Baseline characteristics across two groups were similar and are summarized in Table 1. No significant differences were detected between the two groups in terms of age, gender, weight, height and BMI, ($P > 0.05$).

Demographic Characteristics	Group A	Group B	t Value	P Value
Age	40.60 ± 7.76	44.60 ± 61	0.87	0.40 NS
Gender (M:F)	2:3	2:3		
BMI	26.05 ± 2.48	25.92 ± 1.63	0.09	0.92NS

Table 1. Demographic Data in Group A and B

Graph 1. Comparison of Neck Disability Index in Group A and Group B

Acrom	Group 1 Mean ± SD			Group 2 Mean ± SD		
	Immediate	1st Week	2nd Week	Immediate	1st Week	2nd Week
Flexion	42 ± 10.36	49 ± 9.61	58 ± 10.36	40.40 ± 11.39	40.80 ± 11.38	41.40 ± 11.80
Extension	32.00 ± 12.04	43.00 ± 9.08	55.00 ± 7.90	31.60 ± 1.51	34.00 ± 7.84	37.40 ± 8.64
Rt side flexion	29.00 ± 7.41	35.00 ± 7.07	41.00 ± 4.18	25.20 ± 5.21	30.6 ± 5.85	32.60 ± 6.76
Lt side flexion	29.00 ± 8.21	37.00 ± 6.70	42.00 ± 2.73	28.40 ± 9.39	29.40 ± 7.925	31.8 ± 5.49
Rt side rotation	56.2 ± 8.78	65.6 ± 8.01	73.00 ± 2.12	42.20 ± 6.72	51.8 ± 7.19	63.20 ± 4.81
Lt side rotation	48.40 ± 7.02	60.40 ± 6.69	70.2 ± 3.56	48.2 ± 6.94	58.4 ± 5.41	66.40 ± 2.24
P Value	Intragroup					
Flexion	p = 0.003	p = 0.001	p = 0.001	p = 0.05	p = 0.71	p = 0.41
Extension	p = >0.021	p = 0.001	p = 0.001	p = 0.21	p = 0.27	p = 0.073
Rt side flexion	p = 0.005	p = 0.018	p = 0.016	p = 0.19	p = 0.031	p = 0.022
Lt side flexion	p = 0.005	p = 0.005	p = 0.003	p = 0.033	p = 0.022	p = 0.013
Rt side rotation	p = 0.001	p = 0.001	p = 0.003	p = 0.001	p = 0.001	p = 0.001
Lt side rotation	p = 0.005	p = 0.0001	p = 0.0001	p = 0.005	p = 0.0001	p = 0.0001
	Intergroup (Group 1 and 2)					
Flexion	p = 0.85	p = 0.25	p = 0.046			
Extension	p = 0.94	p = 0.13	p = 0.010			
Rt side flexion	p = 0.37	p = 0.46	p = 0.046			
Lt side flexion	p = 0.91	p = 0.14	p = 0.006			
Rt side rotation	p = 0.022	p = 0.021	p = 0.003			
Lt side rotation	p = 0.96	p = 0.61	p = 0.20			

Table 2. Intragroup and Intergroup Comparisons of Active Cervical Range of Motion

DISCUSSION

In the present study all the interventions administered to group A and B for cervical spine were effective in terms of all outcome measures in individuals with nonspecific neck pain. However, overall improvement was greater in Group A as compared to Group B.

Pain Relief

In the present study pain intensity reduced significantly in both the groups immediately, at the end of 1st week and at the end of 2nd week. The reduction in pain intensity may be attributed to proprioceptive stimulation, release tension from tender points, and localized increased in blood flow which washes out pain causing substance and most importantly the post isometric relaxation which brought after isometric contraction.²¹ Other possible causes could be neurophysiological change, alteration in neuromuscular activity via muscle spindle.

Similar results were reported in the previous study done by F. Okhovatian et al. in 2012 where application of soft tissue manual therapy was proven to be effective in reduction of pain on pain-pressure threshold.^{20,22}

Active Cervical Range of Motion

The possible causes of reduced range of motion found in literature are Pain, muscle spasm, muscle shortening, joint stiffness etc. wherever the movement is inhibited due to pain needs to be facilitated, and proposed reason for the improvement in active cervical range of motion in the present study could be facilitation provided by the soft tissue techniques in the form of muscle energy and strain counterstrain technique which caused reduction in pain and hence improvement in cervical range of motion.^{19,20,22}

Neck Disability Index

The proposed reasons for disabilities are reduced range of motion or inhibition caused by pain which halts overall function out of fear of pain aggravation. The results of the present study reflected significant reduction in pain and improved range of motion which might have caused improvement in the function which was assessed with neck disability index.²³

CONCLUSIONS

The present study concludes that both interventions, muscle energy technique and strain counter-strain technique are effective in the management of nonspecific neck pain and could be utilized as additive tool in routine physiotherapy protocol.

Limitations

- Relative short-term course of intervention
- Role and effect on sympathetic nervous system was not assessed.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

This study is a part of ongoing dissertation for the 1st. Author's degree of Master of physiotherapy (Musculoskeletal physiotherapy) MGM School of physiotherapy, Aurangabad, Maharashtra State, India and was carried out to determine the optimal sample size for the dissertation, Authors would like to thank all the participants in the study who provided full cooperation to the study.

Ethical approval - The study was approved by the ethics committee MGM Medical College Aurangabad (Letter no .MGM-ECRHS/2019/90)

REFERENCES

- [1] Price J, Rushton A, Tyros I, et al. Effectiveness and optimal dosage of resistance training for chronic non-specific neck pain: a protocol for a systematic review with a

- qualitative synthesis and meta-analysis. *BMJ Open* 2019;9(2):e025158.
- [2] Coulter ID, Crawford C, Vernon H, et al. Manipulation and mobilization for treating chronic nonspecific neck pain: a systematic review and meta-analysis for an appropriateness panel. *Pain Physician* 2019;22(2):E55-70.
 - [3] Gross A, Miller J, D'Sylva J, et al. Manipulation or mobilisation for neck pain: a cochrane review. *Man Ther* 2010;15(4):315-33.
 - [4] Binder AI. Musculoskeletal disorders neck pain. *Clinical Evidence* 2008;8(1103):1-34.
 - [5] Jahre H, Grotle M, Smedbråten K, et al. Risk factors for non-specific neck pain in young adults. A systematic review. *BMC Musculoskelet Disord* 2020;21(1):366.
 - [6] Safiri S, Kolahi AA, Hoy D, et al. Global, regional and national burden of neck pain in the general population, 1990-2017: systematic analysis of the Global Burden Of Disease Study 2017. *BMJ* 2020;368:m791.
 - [7] Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. *Eur Spine J* 2006;15(6):834-48.
 - [8] Binder A. The diagnosis and treatment of nonspecific neck pain and whiplash. *Eura Medicophys* 2007;43(1):79-89.
 - [9] Binder AI. Neck pain. *BMJ Clin Evid* 2008;2008:1103.
 - [10] Chaitow L. Muscle energy technique. 4th edn. Churchill Livingstone 2013.
 - [11] Thomas E, Cavallaro AR, Mani D, et al. The efficacy of muscle energy techniques in symptomatic and asymptomatic subjects: a systematic review. *Chiropr Man Therap* 2019;27:35.
 - [12] Wong CK. Strain counterstrain: current concepts and clinical evidence. *Man Ther* 2012;17(1):2-8.
 - [13] Alghadir AH, Iqbal A, Anwer S, et al. Efficacy of combination therapies on neck pain and muscle tenderness in male patients with upper trapezius active myofascial trigger points. *Biomed Res Int* 2020;2020:9361405.
 - [14] Bailey E, Heneghan NR, Cassidy NJ, et al. Clinical effectiveness of manipulation and mobilisation interventions for the treatment of non-specific neck pain: protocol for a systematic review and meta-analysis. *BMJ Open* 2020;10(10):e037783.
 - [15] Coulter ID, Crawford C, Vernon H, et al. Manipulation and mobilization for treating chronic nonspecific neck pain: a systematic review and meta-analysis for an appropriateness panel. *Pain Physician* 2019;22(2):E55-70.
 - [16] López-de-Uralde-Villanueva I, Beltran-Alacreu H, Fernández-Carnero J, et al. Pain management using a multimodal physiotherapy program including a biobehavioral approach for chronic nonspecific neck pain: a randomized controlled trial. *Physiother Theory Pract* 2020;36(1):45-62.
 - [17] Jahre H, Grotle M, Smedbråten K, et al. Risk factors for non-specific neck pain in young adults. A systematic review. *BMC Musculoskelet Disord* 2020;21(1):366.
 - [18] Tsakitzidis G, Remmen R, Dankaerts W, et al. Non-specific neck pain and evidence-based practice. *European Scientific Journal* 2013;9(3):1-19.
 - [19] Kumar GY, Sneha P, Sivajyothi N. Effectiveness of muscle energy technique, ischaemic compression and strain counterstrain on upper trapezius trigger points: a comparative study. *Int J Phys Educ Sports Health* 2015;1(3):22-6.
 - [20] Klein R, Bareis A, Schneider A, et al. Strain-counterstrain to treat restrictions of the mobility of the cervical spine in patients with neck pain-a sham-controlled randomized trial. *Complement Ther Med* 2013;21(1):1-7.
 - [21] Tejera DM, Beltran-Alacreu H, Cano-de-la-Cuerda R, et al. Effects of virtual reality versus exercise on pain, functional, somatosensory and psychosocial outcomes in patients with non-specific chronic neck pain: a randomized clinical trial. *Int J Environ Res Public Health* 2020;17(16):5950.
 - [22] Javaid HMW, Ahmad A, Ajmad F, et al. Effects of conventional physical therapy with or without strain counterstrain in patients with trigger points of upper trapezius; a randomized controlled clinical trial. *Annals of King Edward Medical University* 2016;22(3).
 - [23] Kim D, Lee YJ, Park KS, et al. The effectiveness and cost-effectiveness of motion style acupuncture treatment (MSAT) for acute neck pain: a multi-center randomized controlled trial. *Medicine (Baltimore)* 2020;99(44):e22871.