Section: Orthopaedics

Original Research Article

EFFECT OF MUSCLE ENERGY TECHNIQUE AND INSTRUMENT-ASSISTED SOFT TISSUE MOBILIZATION ON CERVICAL PAIN, RANGE OF MOTION AND FUNCTION IN FORWARD HEAD POSTURE WITH MECHANICAL NECK PAIN- A COMPARATIVE STUDY

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Received : 20/10/2025
Received in revised form : 07/12/2025
Accepted : 26/12/2025

Keywords:
Muscle Energy Technique, Instrument Assisted Soft Tissue Mobilization, Mechanical Neck Pain, Forward Head Posture.

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DOI: 10.47009/jamp.2026.8.1.44

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (1); 223-227

ABSTRACT

Background: Objective: It is to determine the effect of muscle energy technique on cervical pain, Range of motion, function in forward head posture with mechanical neck pain and also to determine the effect of Instrument assisted soft tissue mobilization on cervical pain, Range of motion and function in forward head posture with mechanical neck pain**. Materials and Methods:** Patients with Forward head posture with mechanical neck pain were selected using Simple Random Sampling using a chit method and sample size of 84 were taken 42 in each group and the study was done at Apollo Institute Of Medical Sciences, Hyderabad. The same was divided into 2 groups where Group-A received Muscle Energy Technique+Conventional exercises and Group-B received Instrument Assisted Soft tissue Mobilization+ Conventional exercises and study was done every alternative days for 4 weeks**. Result:** Muscle Energy Technique and Instrument Assisted Soft tissue Mobilization group showed significance of ($p<0.002$), Range of motion ($p< 0.002$), Neck Disability Index ($p<0.461$), Cervical flexion ($p<0.002$), Cervical extension and lateral flexion to right ($p<0.000$) and cervical lateral flexion to left ($p<0.003$). **Conclusion:** Cranio-vertebral angle was significant in muscle energy technique group compared to instrument assisted soft tissue mobilization group. Between group post-test comparison showed significant results with neck pain, Cranio-vertebral angle and Cervical range of motion and no significant results showed for neck function in forward head posture with mechanical neck pain patients.

INTRODUCTION

Neck pain is the second largest cause of disability worldwide. Approximately 70% of individuals are affected during their life causing great burden on society.[1] Mechanical neck pain is a generalized neck pain with mechanical characteristics, including symptoms provoked by Sustained back postures, on performing neck movements. It occurs as a result of poor posture, muscle tension, strain, injury, osteoporosis, fibromyalgia, disc herniation and protrusion, spinal stenosis, meningitis.[2]

Non-specific neck pain is categorized using a grading system:

- Grade 1: No signs of pathology and little or no interference with daily activities
- Grade 2: signs of pathology and interference with daily activities
- GRADE3: Neurologic signs of nerve compression.
- GRADE 4: signs of major pathology.[3]

Forward head posture (FHP): Forward head posture refers to forward movement of head in relation to the shoulder. Forward Head Posture (FHP) can place large stress on the muscles and connective tissue in the cervical spine (CS) and may be a contributing factor to non-specific neck pain.[3] By use of new information and communication technologies has led to increase in time spent on mobile phones or using computers which might have long-term impact on neck pain potentially due to prolonged periods of neck flexion.[4]

MUSCLE ENERGY TECHNIQUE According to Chaitow, Muscle energy technique (MET) is an active isometric contraction method, Muscle energy technique (MET) with Post isometric relaxation

(PIR) helps to increase muscle flexibility due to viscoelastic changes in the muscle and reduce muscle tension.[3]

INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION The biggest goal of Instrument assisted soft tissue mobilization (IASTM) is to remove scar tissues and promote a return to normal function following soft tissue regeneration. When the scar tissue is removed by Instrument assisted soft tissue mobilization (IASTM), functional normalization around the soft tissue can be achieved. Microvascular and capillary hemorrhage, along with localized inflammation, can occur as a result of using IASTM to apply appropriate pressure and shear force to the soft tissue.[5]

MATERIALS AND METHODS

Sanitizer, Goniometer, Vaseline, Instrument assisted soft tissue mobilization tool, Consent form were the materials used in the study and Patients with Forward head posture with mechanical neck pain were selected using Simple Random Sampling using a chit method and sample size of 84 were taken 42 in each group and the study was done at Apollo Institute Of Medical Sciences, Hyderabad. The same was divided into 2 groups where Group-A received Muscle Energy Technique +Conventional exercises and Group-B received Instrument Assisted Soft tissue Mobilization+ Conventional exercises and study was done in every alternative days for 4 weeks. Inclusion criteria: Neck pain for more than 6 weeks, Grade-1 and Grade 2 patients using Non-specific neck pain grading system, Desk Job workers who work for more than 5 hours, Cranio-vertebral angle < 45 degrees, Males and Females are included, Patients with age group of 30-40 years. Exclusion criteria: prolapsed disc, Osteomalacia, Cervical spondylosis, Cervical stenosis, Neurological problems, Ongoing radiotherapy and chemotherapy, Previous history of fractures, Patients with history of surgery in cervical region within a year and the outcome measures used were Universal Goniometer, Numerical Pain Rating Scale

Statistical Analysis: Mean, Standard deviation is calculated for variables Pre and Post intervention and level of significance calculated by SPSS version 24 was used for statistical analysis. The categorical variables were expressed as percentages whereas continuous variables were expressed as mean ± standard deviation. Paired t–test was used for comparing mean difference of two continuous variables from the same group for calculating p-value (p- value <0.05 = significant). Statistical analysis was performed using SPSS version 21 and Microsoft Excel 2019 for graphs representation.

RESULTS

Table 1: Demographic Characteristics of Participants

Demography Characteristics		Group A (N=40)	Group B (N=40)
Age	mean ± sd	34 ± 3.15	34.63 ± 2.92
Gender	Female	17 (42.5%)	26 (65%)
	Male	23 (57.5%)	14 (35%)
Occupation	Architect	2 (5%)	4 (10%)
	Bank employee	2 (5%)	3 (7.5%)
	Fashion designer	3 (7.5%)	2 (5%)
	Govt employee	1 (2.5%)	3 (7.5%)
	IT Employee	30 (75%)	24 (60%)
	Marketing manager	1 (2.5%)	1 (2.5%)
	Teacher	1 (2.5%)	0 (0%)
	Graphic designer	0 (0%)	1 (2.5%)
	Video editor	0 (0%)	2 (5%)

Table 2: Mean Comparison among group A & B

Mean Comparison		Group A		Group B	
		pre-test	post-test	pre-test	post-test
NPRS		3.38 ± 1.31	1.85 ± 0.95	4.2 ± 1.4	2.65 ± 1.21
NDI		0.3 ± 0.05	0.22 ± 0.06	0.28 ± 0.07	0.23 ± 0.07
CVA angle		43.13 ± 1.42	44.38 ± 2.11	42.73 ± 1.47	42.6 ± 1.46
ROM	cervical flexion	69.93 ± 11.93	79.4 ± 7.45	61.75 ± 17.38	70.63 ± 15.94
	cervical extension	40.38 ± 12.37	49.75 ± 11.15	33.13 ± 4.03	37.88 ± 6.97
Cervical lateral flexion	Right	27.83 ± 6.83	33.25 ± 5.83	33 ± 5.16	37.95 ± 4.9
	Left	32.38 ± 5.31	35.63 ± 6.22	35.13 ± 5.72	39.4 ± 4.52

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 3: Association between group A among pre and post-test

Group A		Mean Difference	t-test	95% Confidence Interval		p-value
				Lower	Upper	
NPRS	pre-post	1.53 ± 0.93	10.33	1.23	1.82	0.000***
NDI	pre-post	0.08 ± 0.07	7.71	0.06	0.1	0.000***
CVA angle	pre-post	-1.25± 1.93	-4.09	-1.87	-0.63	0.000***
ROM (cervical flexion)	pre-post	-9.48± 7.46	-8.04	-11.86	-7.09	0.000***

Table 4: Association between group B among pre and post-test

Group B		Mean Difference	t-test	95% Confidence Interval		p-value
				Lower	Upper	
NPRS	pre- post	1.55 ± 1.13	8.67	1.19	1.91	0.000***
NDI	pre- post	0.05 ± 0.03	11.56	0.04	0.06	0.000***
CVA angle	pre- post	0.13 ± 0.79	1	-0.13	0.38	0.323
ROM (cervical flexion)	pre- post	-8.88±7.55	-7.43	-11.29	-6.46	0.000***
ROM (cervical extension)	pre- post	-4.75±6.79	-4.43	-6.92	-2.58	0.000***
Cervical lateral flexion (Right)	pre- post	-4.95 ± 3.6	-8.71	-6.1	-3.8	0.000***
Cervical mlateral flexion (Left)	pre- post	-4.28±3.45	-7.84	-5.38	-3.17	0.000***

Note: p-value is given by paired t-test and *, **, *** refer to <0.05, <0.01 and <0.001 level of significance

Table 4 shows the mean difference ± SD values of the pre & post-test of group B for NPRS, NDI, CVA, ROM (cervical flexion & cervical extension) and Cervical lateral flexion (Right & Left) which were 1.55 ± 1.13, 0.05 ± 0.03, 0.13 ± 0.79, -8.88 ± 7.55, -4.75 ± 6.79, -4.95 ± 3.6, and -4.28 ± 3.45 respectively. Except CVA rest all the variables of group B were highly statistically significant with 95% of level of significant (p value < 0.05).

Table 5: ANOVA of Pre-test among group A & B

Pre-test		Sum of Squares	df	Mean Square	F-test	p-value
NPRS	Between Groups	13.613	1	13.613	7.385	0.008*
	Within Groups	143.775	78	1.843		
	Total	157.388	79			
NDI	Between Groups	0.008	1	0.008	2.137	0.148
	Within Groups	0.285	78	0.004		
	Total	0.293	79			
CVA angle	Between Groups	3.2	1	3.2	1.537	0.219
	Within Groups	162.35	78	2.081		
	Total	165.55	79			
ROM (cervical flexion)	Between Groups	1336.612	1	1336.612	6.018	0.016*
	Within Groups	17324.28	78	222.106		
	Total	18660.89	79			
ROM (cervical extension)	Between Groups	1051.25	1	1051.25	12.417	0.001**
	Within Groups	6603.75	78	84.663		
	Total	7655	79			
Cervical lateral flexion (Right)	Between Groups	535.613	1	535.613	14.609	0.000***
	Within Groups	2859.775	78	36.664		
	Total	3395.388	79			
Cervical lateral flexion (Left)	Between Groups	151.25	1	151.25	4.97	0.029*
	Within Groups	2373.75	78	30.433		
	Total	2525	79			

Note: *, **, *** refer to <0.05, <0.01 and <0.001 level of significance

Table 5 shows the output of the ANOVA analysis and whether there is a statistically significant difference between our groups A & B means of pre-test. We can see that except NDI & CVA rest all the variable of groups A & B of pre-test are below 0.05 (p- value < 0.05) and, which means, it is a statistically significant difference in the mean of NPRS, ROM (cervical flexion & extension), Cervical lateral flexion (Right & Left) of pre-test between groups A & B means.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 6: ANOVA of Post-test among group A & B

Post-test		Sum of Squares	df	Mean Square	F-test	p-value
NPRS	Between Groups	12.8	1	12.8	10.829	0.002**
	Within Groups	92.2	78	1.182		
	Total	105	79			
NDI	Between Groups	0.002	1	0.002	0.548	0.461
	Within Groups	0.299	78	0.004		
	Total	0.301	79			
CVA	Between Groups	63.012	1	63.012	19.126	0.000***
	Within Groups	256.975	78	3.295		
	Total	319.987	79			
ROM (cervical flexion)	Between Groups	1540.013	1	1540.013	9.951	0.002**
	Within Groups	12070.98	78	154.756		
	Total	13610.99	79			
ROM (cervical extension)	Between Groups	2820.313	1	2820.313	32.63	0.000***
	Within Groups	6741.875	78	86.434		
	Total	9562.188	79			
Cervical lateral flexion (Right)	Between Groups	441.8	1	441.8	15.225	0.000***
	Within Groups	2263.4	78	29.018		
	Total	2705.2	79			
Cervical lateral flexion (Left)	Between Groups	285.012	1	285.012	9.645	0.003**
	Within Groups	2304.975	78	29.551		
	Total	2589.987	79			

Note: *, **, *** refer to <0.05, <0.01 and <0.001 level of significance

Table 6 shows the output of the ANOVA analysis and whether there is a statistically significant difference between our groups A & B means of post-test. We can see that except NDI, rest all the variable of groups A & B of post-test are below 0.05 (p-value < 0.05) and, which means, it is a statistically significant difference in the mean of NPRS, CVA, ROM (cervical flexion & extension), Cervical lateral flexion (Right & Left) of post-test between groups A & B means.

DISCUSSION

In this study we demonstrated the effect of Muscle energy technique and Instrument assisted soft tissue mobilization on cervical pain, Range of motion and Function in forward head posture with mechanical neck pain. Pain, Range of motion, Cranio-vertebral angle and Function was assessed using Numerical pain rating scale, Goniometer, and Neck disability index respectively.

The present study was done on 84 patients and 4 patients were withdrawn from the study where they were divided into two groups with 40 patients in each group selected randomly by using chit picking method. All the patients were assessed before and at the end of the study by numerical pain rating scale, Goniometer and Neck disability index. Numerical pain rating scale were highly statistically significant with 95% level of significance on finding the association of group-A pre and post- test (p value =0.000), association between group-B pre and post-test (p value =0.000), Anova of pre-test among Group-A and Group-B is (p value=0.008), Anova of post- among group-A and group-B (p=0.002)

[chitra kataria..eta.l;] conducted a study on Muscle energy technique in patients with mechanical neck pain and concluded that muscle energy technique was affective in alleviating the neck pain in terms of decreasing the pain intensity.[6]

[Mohamed Serag Eldein Mahgoub Mostafa.et.al;] conducted a study on effect of instrument assisted soft tissue mobilization on patients with mechanical neck pain and concluded that it has superior effect in relieving the neck pain in addition to the agreement with [Mothimath et.al]; who conducted a study on Instrument assisted soft tissue mobilization (IASTM) and concluded that by using M2T blade it helped in reducing neck pain by decreasing spasm by giving rhythmic strokes through the fascia until the bonds and cross links in the muscle are broken and the release of fascia.[7]

Goniometer (cervical flexion & cervical extension) and Cervical lateral flexion (Right & Left) values were highly statistically significant with 95% level of significance on finding the association of group-A pre and post- test (p value <0.000), association between group-B pre and post-test (p value=0.000), Anova of pre-test among Group-A and Group-B is (P value=0.016, 0.001, 0.000), Anova of post- among group-A and group-B (p=0.002, 0.001,0.001)

Upper trapezius and the levator scapulae are the most common muscles that get shortened leading to reduced cervical mobility. [Richa Mahajan..et.al;] conducted a study on Muscle energy technique in

ISSN (O): 2687-5365; ISSN (P): 2753-6556

patients with subacute mechanical neck pain and concluded that Muscle energy technique was effective in increasing active cervical range of motion.[6]

[Konstantinos Mylonas..et.al;] conducted a study on combining targeted instrument assisted soft tissue mobilization and neuromuscular exercises on forward head posture with mechanical neck pain and the Range of motion was assessed using goniometer and the cervical Range of motion appear to have been positively affected by Instrument assisted soft tissue mobilization by the end of 4th week.[8]

Cranio-vertebral angle were highly statistically significant with 95% level of significance on finding the association of group-A pre and post-test (p value =0.000), association between group-B pre and post-test (p value=0.323), Anova of pre-test among Group-A and Group-B is (P value=0.219), Anova of post- among group-A and group-B (p=0.000).

[Reema Joshi..et.al;] Conducted a study on Muscle energy technique and posture correction exercises on forward head posture with mechanical neck pain on 21-60 years age group with CVA angle less than 48 degrees where post isometric relaxation stretch was given and concluded that there was significant improvement in posture and there was a significant improvement in Cranio-vertebral angle.[3] Neck disability index were highly statistically significant with 95% level of significance on finding the association of group-A pre and post- test (p value =0.000), association between group-B pre and post-test (p value=0.000), Anova of pre-test among Group-A and Group-B is (P value=0.148), Anova of post- among group- A and group-B (p=0.461).

[Divya Kataria..et.al;] conducted a study on Muscle energy technique on patients with mechanical neck pain where this technique utilizes muscles own energy as delicate isometric withdrawls to loosen up the muscles and also leading to viscoelastic changes leading to increasing the extensibility of the muscles and concluded that with mechanical neck pain combined with conventional exercises produced significance greater than 0.005.[9]

CONCLUSION

Both Muscle energy technique and Instrument assisted soft tissue mobilization showed significant results in reducing mechanical neck pain, neck Range of motion, function in patients with forward head posture with mechanical neck pain. Cranio-vertebral angle was significant in muscle energy technique group compared to instrument assisted soft tissue mobilization group. Between group post-test comparison showed significant results with neck pain, Cranio-vertebral angle and Cervical range of motion and no significant results showed for neck function in forward head posture with mechanical neck pain patients.

Additional Information

No conflicts of interest

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ISSN (O): 2687-5365; ISSN (P): 2753-6556