Int. j. adv. multidisc. res. stud. 2026; 6(2):1285-1289

Received: 20-02-2026
Accepted: 01-04-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Comparative Effectiveness of Active Isolated Stretching, Muscle Energy Technique and Myofascial Release in Non Specific Neck Pain

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DOI: https://doi.org/10.62225/2583049X.2026.6.2.6098
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Abstract

Non specific neck pain is a common musculoskeletal condition affecting functional ability and quality of life. Various physiotherapy interventions such as active isolated stretching (AIS), muscle energy technique (MET) and myofascial release are used in clinical practice, but their comparative effectiveness remains unclear. Objective: To compare the effectiveness of AIS, MET and MFR in reducing pain and improving cervical range of motion in individuals with non - specific neck pain. Methods: A total of 130 participants aged 18 - 30 years with non specific neck pain were recruited and randomly divided into three groups: MET (group A), MFR (group B) and AIS (group C). Interventions were administered three times per week. Pain intensity was measured using the numerical pain rating scale (NPRS) and cervical range of motion was assessed using a goniometer. Data were analysed using ANOVA and post hoc test. Results: All three groups showed significant improvement in pain and cervical range of motion following intervention. However, intergroup comparison revealed no statistically significant difference in pain reduction ($p > 0.05$). Significant differences were observed in certain range of motion parameters such as lateral flexion and rotation ($p < 0.05$). Conclusion: AIS, MET and MFR are equally effective in managing non- specific neck pain. These interventions can be used interchangeably in clinical practice based on patient needs and therapist preferences. Keywords; Non-specific neck pain, active isolated stretching, muscle energy technique, myofascial release, range of motion, NPRS.

Keywords: Myofascial, Muscle Energy Technique (MET), Active Isolated Stretching (AIS)

Introduction

One of the most prevalent musculoskeletal problems is neck pain. Absence of a diagnosable underlying illness or faulty anatomical structure characterizes non-specific neck pain. Non-specific neck discomfort has gained recognition in recent years as one of the major causes of impairment in the general population.[1] (Cerezo-Téllez, E., *et`al* 2016) [10]. In the general population, between 10% and 15% of people report having neck pain. The symptoms of non-specific neck pain are more similar to the symptoms of whiplash related disorder, grade I & grade II That's the reason a gold standard assessment is lacking for the diagnosis of non-specific (Ester Cerezo-Te´llez *et`al* 2016). It limits the activities of daily living, it also results in long term sick leave and can also lead to further disability (Mary Takla, Alshayma Shaaban Abd El- Azeim 2020). Thus, acute management of acute neck pain is necessary prior to the generation of chronic neck pain. There are three categories of non specific neck pain followed by acute non specific neck pain that lasts less than 4 weeks, sub acute non specific neck pain lasts for 1-4 months and chronic non specific neck pain last for more than 4 months (Binder A 2007) [7].

Recent study suggests various managements for musculoskeletal pain, including medication and much more invasive treatment, like drug injections. Moreover, these treatments have side effects similar to digestive problems. whereas, the implementation of non-invasive treatment for musculoskeletal pain consists of stretching, massage, and muscle energy technique.[4] (Sbardella.S., Russa.C.L *et`al* 2021) [30] besides those electrotherapy modalities like interferential therapy, transcutaneous electrical nerve stimulation, ultrasound heat application, cryotherapy can be given to patient.[5] (Arianne P

Verhagen, 2021) Stretching is further divided into various types; one of the most effective stretching techniques is active isolated stretching. This stretching was designed by Aaron mattes, static stretching has been frequently used as a gold standard method for improving muscle flexibility. Anyhow, it may hinder blood circulation, lactic acid elevation and enhance tissue ischemia.[6] (Mattes, A. L. 1996) It may also cause injury of tendons ligaments, lymphatic and muscle tissue. Active isolated stretching enables the muscles to lengthen without stimulating the stretch reflex and reciprocal contraction of the antagonist muscle. Active isolated stretching is based on the principle of muscle isolation, repetition less than 2 seconds of hold time and breathing control (exhale on stretch and inhale on release) Active isolated stretching engages a single muscle at time.[7] (Qamar *et`al* 2021) The second technique is muscle energy technique followed by relaxation and passive stretching. The effect of muscle energy technique includes increased strength and lengthening, as well as improved circulation.[8] (Hye Mi Jeong, Jae Hoon Shim *et`al* 2017) A approach for mobilizing soft tissues is called myofascial release (MFR). It is "the facilitation of mechanical, neurological and psycho physiological adaptive potential as interfaced via the myofascial system," according to one definition. In the 1960s, Robert Ward, an osteopath, is credited with creating the term MFR. MFR therapy manipulates the myofascial complex using precisely guided low load, long duration mechanical pressures with the goals of restoring optimum length, reducing discomfort, and enhancing function [9] (Daxa Mishra, R Harihara Prakash *et`al* 2018). MFR uses manual traction and extended muscle and fascial stretches to break down adhesions, which reduces discomfort and improves flexibility and range of motion (ROM). It is important to investigate this technique in modern society due to the increase in patient outcomes.[9]

Materials and Method

This experimental study was conducted at the College of Physiotherapy, AIMSR, Adesh University, Bathinda. A total of 130 participants aged 18-30 years with non specific neck pain were included.

Inclusion criteria:

1. Students of college of physiotherapy, AIMSR, Adesh University, Bathinda
2. Students who have Non-specific neck pain
3. Both male and female

- **Exclusion criteria**

1. Those who are already diagnosed with any pathological, neurological or anatomical condition of the neck.
2. Cervical radiculopathy, myelopathy or referred pain.
3. Recent fracture or trauma related to neck or cervical spine
4. Individual on regular medication

Study design: Participants were randomly allocated into three groups:

1. Group A: Muscle energy technique (MET)
2. Group B: Myofascial release (MFR)
3. Group C: Active isolated stretching (AIS)

Each group received treatment three times per week.

Outcome measure: Pain intensity assessed using the numerical pain rating scale and Cervical range of motion measured using a goniometer.

Intervention Protocol

Active isolated stretching: Performed in a seated position with controlled breathing. Each stretch was held for 2 seconds targeting muscle such as sternocleidomastoid, trapezius, elevator scapulae and scalene. **Muscle energy technique:** Patients in this group received muscle energy technique for upper trapezius and levator scapulae muscle, scalene and Sternocleidomastoid muscle for 5 repetitions using 30% of maximal isometric contraction for 10 seconds keeping the stretch beyond resistance barrier for 30 to 60 seconds. **Myofascial release:** The individual began the sternocleidomastoid muscle and scalene myofascial release technique while lying supine, rotating their neck, and flexing their position in the opposite way. Positioned at the subject's back is the therapist. In order to perform upper trapezius myofascial releases, the patient was positioned comfortably supine on the couch. After applying petroleum jelly to the affected area, release the muscle over the muscle belly by moving your fingers in a circular motion. (Chaturvedi N *et al*, 2022). The patient was lying on his or her side with bowed knees for levator scapulae. An inch below the hairline, the therapist's palm was put behind the patient's neck. The patient was told to tilt his or her nose towards the ceiling. The therapist would then begin providing MFR by gently applying pressure to the patient's muscle with a circular motion of the thumb. (Kshipra *et al* 2020). The myofascial release was given to 90 seconds for each muscle.After the completion of data collection, data was analysed by using ANOVA.

Result

All three groups demonstrated improvement in pain reduction and cervical range of motion after intervention. Range of motion: Significant improvements were observed within all groups. Inter group comparison showed no significant difference in flexion and NPRS scores. Whereas, significant difference observed in extension, lateral flexion and rotation. Pain level decreased significantly within each group. However, intergroup comparison showed no statistically significant difference.

Discussion

Neck discomfort is one of the most common musculoskeletal issues and the fourth largest contributor to disability globally (**Binder 2007**) [7]. Non-specific neck discomfort is characterised by the lack of an identifiable underlying medical condition or defective anatomical component. (**Cerejo *et al,* 2016**). "Pain between the superior nuchal line and the spinous process of the first thoracic vertebra in the back of the neck" is how non-specific neck pain is defined (**Miller *et al,* 2010**).

The current study was conducted to find out the best treatment among three physiotherapy techniques. Active isolated stretching, muscle energy technique and myofascial release has been compared in current study. The result of the study suggest that within group comparison of muscle energy technique for flexion, extension, lateral flexion (both left and right) and rotation is highly significant as the range of motion increases after the treatment session and the NPRS score was also reduced. Similarly, a study conducted by Long-Huei Lin **in the year 2023** the outcomes demonstrated that Muscle Energy Technique greatly

decreased the intensity of pain. Subgroup analysis, however, showed that this important advantage was not shown with Muscle Energy Technique alone, but rather only when Muscle Energy Technique was used in conjunction with other therapies. Muscle Energy Technique lessened disability as well. Greater pain reduction was found to be correlated with longer therapy sessions per week, according to meta-regression analysis. There were no documented negative effects after the Muscle Energy Technique. Similarly, When it comes to improving neck range of motion Myofascial release stands out as an effective treatment after the within group analysis. The findings of current study correlates with the study of **Lea Overmann *et al,* 2023** where they found out that 549 people in ten randomised controlled trials satisfied the qualifying requirements. The results showed that increases in pressure pain threshold had no discernible impact. But in current study pain threshold was also reduced. **Llamosas S**. on Modifications in cervical myofascial induction technique-induced changes in neck mobility and pressure pain threshold levels in pain-free healthy persons. **Matheny, 1995; Warldron, 1994; Lee, 1997** endorse the use of Active Isolated Stretching; however there is little proof of its efficacy. The result of the study came out to be significant when it was compared within the group of pre-treatment and post treatment. Within group comparison of Numerical Pain Rating Scale came out to be < 0.001 and in terms of range of motion also the P value was < 0.001 and the overall result for intra group comparison was significant. Similarly, a study conducted by **Vernetta *et al.,* 2014** to check the Impact of active isolated stretching technique on peak isometric force and range of motion acutely. According to the study, because no data has been found in history, active isolated stretching has not been used for neck treatment but active isolated stretching has definitely been used for lengthening and treatment of other muscles. So we used active isolated stretching to improve neck range of motion so that we can know the effectiveness of this treatment or this treatment can be used in the future. In 1985, Aron Mates identified this technique and gave its name but we have no mention of this technique in India as such it may be used by clinicians but after searching the data we found no mention of it for neck treatment. No strong evidence related to this was found. But in Pakistan a study by **Jawad Naweed in 2020** shows that active isolated stretching has significant improvement in hamstring flexibility. The treatment technique is definitely used to increase the range of hamstring muscle or to reduce pain intensity. In our study its results have shown much improvement or improvement is clearly visible.

However when the inter group comparison was done the P value for post treatment of flexion comparison was 0.422 as it shows not significant result. The mean of flexion in MET before treatment it was 40.95 and the standard deviation was ±6.891 however, post treatment mean was increased and came out to be 47.70. The standard deviation was ±7.252. In case of MFR the mean before treatment was 44.18 and post treatment it was 49.70. The standard deviation before MFR was 6.728 and post treatment it was 7.908. When the AIS group`s result was calculated before treatment mean was 42.48 and post treatment it came out as 49.16, the standard deviation before treatment it was 7.306 and post treatment it came out as 6.867. The treatment is effective individually as all the treatment is having their own effect and all the three treatment shows significant improvement independently. While, in case of extension, lateral flexion (both left and right) and rotation was significant. The P value was 0.164, <0.001 and < 0.001 respectively for all the three domains of neck range of motion. Whereas, NPRS post treatment inter group comparison shows not significant result. Similarly, **Adarsh *et al.,* 2019** his study was to Compare Cervical Manual Therapy, Muscle Energy Technique, and Myofascial Release for Postural Neck Pain. In current study, active isolated stretching, muscle energy technique and myofascial release was compared with non-specific neck pain in college students. If seen individually, the result of pre-treatment and post treatment was found, one subject's range of motion improved, everyone's pain had already reduced, but when three treatments were compared, the result was not significant at some places because the result of both the treatments was not significant. That improvement was seen after all treatments.

Conclusion

This study concludes that active isolated stretching, muscle energy technique and myofascial releases are equally effective treatment methods. Hence, the null hypothesis has been accepted. None of the study shows higher rate of effectiveness during comparison. We can use it in our clinical practice. Or for better comparison, by disrupting the time period of study or changing the sample size along with home advice, we can get better results. To improve range of motion; flexion, extension, lateral flexion and rotation all these three interventions gives the best result as this also reduced the pain intensity.

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