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A Study to see the Comparison on the Effect of Myofascial Release Technique and Muscle Energy Technique on Scalene and Levator Scapulae Muscles for Pain and Neck Disability Among Patients with Mechanical Neck Pain

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Abstract:
Neck pain is common nowadays. Causes of neck pain are poor posture, neck strain, sporting, anxiety etc. that occurs more in women than men. Mechanical neck pain is provoked by sustained neck postures, neck movements and pain on palpation of cervical muscles. As there are many muscles connected to neck, some of them include scalene and levator scapulae which also contribute to neck pain because they are most common location for trigger points. Methodology: The study spanned one and a half years, five days a week for 2 weeks, enrolling 45 eligible subjects aged 18 to 45. Participants were randomly divided into three groups-A, B, and C-with 15 subjects in each group. Group A will be given US, high TENS 80 to 120 Hz with hot pack for 15 minutes and neck isometrics with stretching. Group B and C was experimental groups. Group B will be given ultrasound therapy (US), high transcutaneous electrical nerve stimulation (TENS) with hot pack for 15 minutes and myofascial release. Group C will be given US, high TENS with hot pack for 15 minutes and muscle energy technique. Baseline data was recorded on day one and post-intervention data at the end of week two. Results: Statistical analysis revealed that by the 10th day, all groups improved significantly in pain and neck disability, with group B showing the most remarkable results. Conclusions: Myofascial release is significantly more effective than muscle energy technique in improving outcomes.

Keywords: Mechanical neck pain, myofascial release technique, muscle energy technique.

Introduction

Neck pain is characterized as discomfort localized to the anatomical neck region without any radiation to the upper limbs. Mechanical neck pain is specifically defined as discomfort arising from static positions or movements of the cervical spine, excluding neurological symptoms. Janda observed that postural muscles, such as the upper trapezius, levator scapulae, and scalene, tend to shorten in both healthy and pathological conditions.[1,2,3,4,5] The cervical spine experiences stress and strain during everyday activities like speaking, moving, sitting, standing, walking, or even while resting. Its position can also reveal mood

and attitude. A flexed spine often signifies emotions such as sadness, withdrawal, mourning, or even prayer ("bowing" the head in supplication).[6,7] While the definition of mechanical neck pain (MNP) varies in the literature, it can be defined as pain located in the cervical spine, including the cervicothoracic junction, which is exacerbated with cervical motion, sustained postures, and/or palpation of the cervical musculature.[8] It is specifically defined as pain occurring in the posterior neck area, spanning from the superior nuchal line to the spine of the scapula, and extending to the lateral borders down to the superior edge of the clavicle and the suprasternal notch.[2]

Neck pain is a prevalent issue among office workers. Globally, research has indicated that the one-year prevalence of neck pain among administrative employees ranges between 15% and 34.4%.[1,9] Neck pain is more common in women around the age of 45 than in men around the age of 60. There are many treatment methods for neck pain such as manual therapies, physical therapy, hot packs, ice application, electrotherapy, patient education, acupuncture, non-steroidal drugs, and collars. Among manual therapy techniques, methods like stretching, Mulligan technique, positional release, myofascial release, and muscle energy techniques are frequently used. I focused specifically on myofascial release and muscle energy techniques.[10] Myofascial release therapy is a specialized manual massage technique focused on addressing restrictions within the fascia, the connective tissue surrounding muscles.[11] Myofascial release therapy is the soft tissue technique or manual massage technique that involves the application of low load and long duration stretch applied through knuckles or elbows on the restricted fascia that is facilitated by detecting the restriction in fascia. Myofascial Release is referred to as a manual massage technique that is performed for stretching the fascia and releasing the bonds between fascia and skin, muscles and bones, with the aim of relieving pain, increasing the range of motion and body balance.[12] It is said that the entangled fascia results in pain, reduces the range of motion and also the flexibility and stability, and will decrease the tolerance to deal with stress and strain.

Muscle energy technique is a versatile technique utilized to address various muscular and joint issues. It can be employed to lengthen or relax spastic muscles, strengthen muscles that have been weakened, reduce localized swelling (edema), and mobilize joints that are restricted in movement.[13] This multifaceted approach makes it highly effective in improving overall physical function and promoting healing in affected areas.[2] Muscle Energy Technique is an active manual therapy where the patient plays a central role in producing voluntary muscle contractions of varying intensity, rather than the physiotherapist controlling the corrective force. Introduced in sss1989 by Greenman PE, MET involves different types of muscle contractions: isometric, concentric, and eccentric. This technique is designed to enhance joint range of motion, resolve muscle contracture or weakness, and reduce localized edema through rhythmic muscle stimulation. It induces reciprocal inhibition of the agonist muscle, a neurophysiological response mediated by Golgi tendon organs. Patients can also engage in isotonic contractions, therapist's force either partially matches (eccentric) or overcomes (concentric) the patient's effort. MET aims to stretch, strengthen, and relax muscles, making it a valuable rehabilitative option for addressing non-specific neck pain.[13]

Methodology

Study Design: Quasi experimental comparative study design. Convenient sampling was done. Study was performed in Outpatient department of orthopaedics of DAV institute of physiotherapy and rehabilitation and its affiliated hospitals, Jalandhar. Total duration of the study was one and a half year. A minimum of

45 subjects were enrolled in the study. The subjects were further divided into 3 groups: i.e. group A, group B and group C, 15 subjects in each group.

Procedure

All the subjects were selected based on the following inclusion and exclusion criteria. A written informed consent was obtained from all the subjects and were assessed for pain level with Visual Analogue Scale (VAS), neck range of motion (ROM) with universal goniometer (360°) and neck disability with neck disability index (NDI). Group-A (control group) were given conventional therapy (US + hot pack+ TENS for 15 min and neck isometrics+ stretching). Group-B (experimental group 1) were given Myofascial release technique along with the conventional therapy. Group-C (experimental group 2) were given Muscle energy technique along with the conventional therapy.

Control group

The subjects were given hot pack and TENS and isometric exercises. Subjects were asked to lie in a comfortable position and hot pack was applied on back for 15 min along with TENS, the frequency was 80 to 120 Hz, followed by ultrasound therapy for 5 minutes, frequency was 1.2 w/cm^2. Static stretching given for 30 seconds followed by 30 seconds of relaxation. Neck isometrics were taught to the patient.

Experimental group (Myofascial release technique)

Group B were given conventional therapy that included high TENS for 15 mins with hot pack, ultrasound therapy for 5 mins with 1.2w/cm^2 along with myofascial release therapy by making the patient in a comfortable position and performing the technique as referred from article 13.

Figure 1- MFR on Scalene Muscle, Levator Scapulae muscle, MET on Scalene muscle, Levator Scapulae Muscle

Experimental group (Muscle energy technique)-

Group C were given conventional therapy that included high TENS for 15 mins with hot pack, ultrasound therapy for 5 mins with 1.2w/cm^2 along with muscle energy technique by making the patient in a comfortable position and performing the technique as referred from article 14.

Results

This study aimed to convert raw data into meaningful insights by providing a detailed explanation of the findings. The research was conducted to compare the effects of two therapeutic techniques—Myofascial Release and Muscle Energy Technique —on the scalene and levator scapulae muscles in patients experiencing mechanical neck pain. The outcomes measured included pain intensity and neck disability. Participants were divided into three groups: Group A – Control group (received no specific therapeutic intervention). Group B – Experimental group treated with Myofascial Release. Group C – Experimental group treated with Muscle Energy Technique. Two sets of readings were collected using the Visual Analog Scale (VAS): Day 0 (Pre-Intervention) Day 10 (Post-Intervention. This approach helped in assessing the effectiveness of each technique over a 10-day period. The data was analyzed using SPSS version 18, and paired t-tests were employed to compare the variables within and between the three groups. The threshold for statistical significance was set at $p \leq 0.05$.

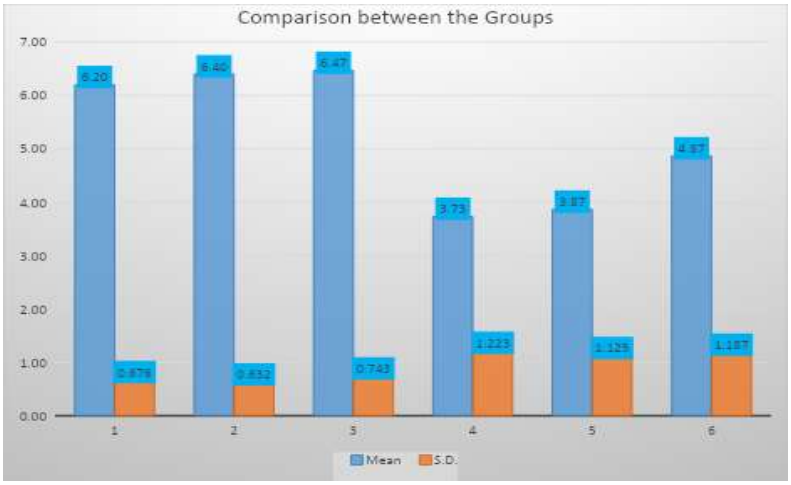

Figure 2: Graphical representation of VAS between groups A, B and C

Table 1: Comparison of mean for VAS between groups A, B and C using ANOVA and NDI between groups A, B and C using ANOVA

Mean	Groups	Baseline (Day "0")	10thDay	F-test 0 Day	10 Day	T - value	P-Value
VAS	GA	6.20±0.676	3.73±1.223	0.615	4.14	3.16	0.021
	GB	6.40±0.632	3.87±1.125	0.615	4.14	3.16	0.021
	GC	6.47±0.743	4.87±1.187	0.615	4.14	3.16	0.021
NDI	GA	16.13±8.700	8.40±5.816	0.270	3.67	3.16	0.032
	GB	16.40±9.716	9.33±5.108	0.270	3.67	3.16	0.032
	GC	15.73±4.317	13.33±4.938	0.270	3.67	3.16	0.032

Between-Group Comparison:

Visual Analog Scale (VAS)- A substantial and statistically significant improvement in pain intensity was observed across all three intervention groups by the 10th day. Group GA showed a reduction from

6.20 ± 0.676 to 3.73 ± 1.223, Group GB from 6.40 ± 0.632 to 3.87 ± 1.125, and Group GC from 6.47 ± 0.743 to 4.87 ± 1.187. The between-group comparison revealed a consistent mean difference of 0.615, with a t-value of 3.16 and a p-value of 0.021, indicating a statistically significant reduction in pain levels across groups, with GA and GB showing greater clinical benefit than GC.

Neck Disability Index-Functional improvement was also significant across groups. Group GA improved from 16.13 ± 8.700 to 8.40 ± 5.816, Group GB from 16.40 ± 9.716 to 9.33 ± 5.108, and Group GC from 15.73 ± 4.317 to 13.33 ± 4.938. The mean difference of 0.270, with a t-value of 3.16 and p = 0.032, confirms a statistically significant reduction in disability, with GA and GB exhibiting more pronounced improvement than GC. This version emphasizes statistical relevance and highlights the clinical impact in a professional and polished way.

Visual Analog Scale (VAS) -Between Group Comparison: On the 10th day, all groups showed a significant reduction in pain intensity, but Group GA and GB demonstrated more pronounced improvements compared to Group GC. Group GA improved from 6.20 ± 0.676 to 3.73 ± 1.223, Group GB improved from 6.40 ± 0.632 to 3.87 ± 1.125, Group GC improved from 6.47 ± 0.743 to 4.87 ± 1.187 Despite similar baseline values, GA and GB showed greater reductions in VAS scores compared to GC. The between-group comparison revealed a statistically significant difference *(t = 3.16, p = 0.021)*, confirming that intervention protocols in GA and GB were more effective in reducing pain than in GC.

Neck Disability Index (NDI) – Between Group Comparison: Functional disability scores (NDI) also declined across all groups, with Group GA and GB again showing superior improvements. Group GA: from 16.13 ± 8.700 to 8.40 ± 5.816, Group GB: from 16.40 ± 9.716 to 9.33 ± 5.108, Group GC: from 15.73 ± 4.317 to 13.33 ± 4.938 Although all groups showed significant intra-group improvements, between-group analysis revealed greater functional recovery in GA and GB compared to GC, with statistically significant differences *(t = 3.16, p = 0.032)*. This indicates that the therapeutic interventions administered in GA and GB were substantially more effective in enhancing neck function.

Table 2: Inter group analysis of VAS between groups A, B and C using Paired T test

Mean	Groups	Baseline (Day "0")	10th Day	Paired t-test
VAS	GA	6.20±0.676	3.73±1.223	11.458
	GB	6.40±0.632	3.87±1.125	8.718
	GC	6.47±0.743	4.87±1.187	5.871
P-value		0.544	0.0021	
T-value		3.159	3.159	

The Visual Analog Scale (VAS) scores showed a significant reduction in pain in all three groups from baseline (Day 0) to the 10th day. In Group GA, the mean/ S.D, VAS score decreased from 6.20 ± 0.676 to 3.73 ± 1.223, with a paired t-test value of 11.458, indicating a statistically significant improvement. Similarly, Group GB showed a reduction from 6.40 ± 0.632 to 3.87 ± 1.125, with a paired t-value of 8.718, also reflecting a significant improvement. Group GC experienced a decrease from 6.47 ± 0.743 to 4.87 ± 1.187, and the paired t-test value of 5.871 confirmed this reduction was statistically significant as well. Between-group comparisons revealed that the difference between Groups GA and GB was not statistically

significant (t = 3.159, p = 0.544), whereas the comparison involving Group GC showed a significant difference (t = 3.159, p = 0.0021), suggesting that Groups GA and GB improved more than GC over the 10-day period.

Table 3: Inter group analysis of NDI between groups A, B and C using Paired T test

Mean	Groups	Baseline (Day "0")	10thDay	Paired t-test
NDI	GA	16.13±8.700	8.40±5.816	4.252
	GB	16.40±9.716	9.33±5.108	4.802
	GC	15.73±4.317	13.33±4.938	3.899
P-value		0.764	0.032	
T-value		3.159	3.159	

The Neck Disability Index (NDI) scores showed a significant reduction from baseline to the 10th day in all three groups, indicating improvement in neck disability over time. In Group GA, the mean NDI score decreased from 16.13 ± 8.700 at baseline to 8.40 ± 5.816 on the 10th day. This change was statistically significant, with a paired *t*-test value of 4.252. Similarly, Group GB showed a reduction in mean NDI score from 16.40 ± 9.716 to 9.33 ± 5.108, with a paired *t*-test value of 4.802, also reflecting a statistically significant improvement. In Group GC, the NDI score decreased from 15.73 ± 4.317 to 13.33 ± 4.938, with a paired *t*-test value of 3.899, indicating a statistically significant but less pronounced improvement compared to the other groups. Inter-group comparison showed a *t*-value of 3.159 for both comparisons. The comparison between Groups GA and GB yielded a p-value of 0.764, indicating no statistically significant difference between the two. However, the comparison involving Group GC resulted in a p-value of 0.032, suggesting a statistically significant difference, with Groups GA and GB showing greater improvement than GC.

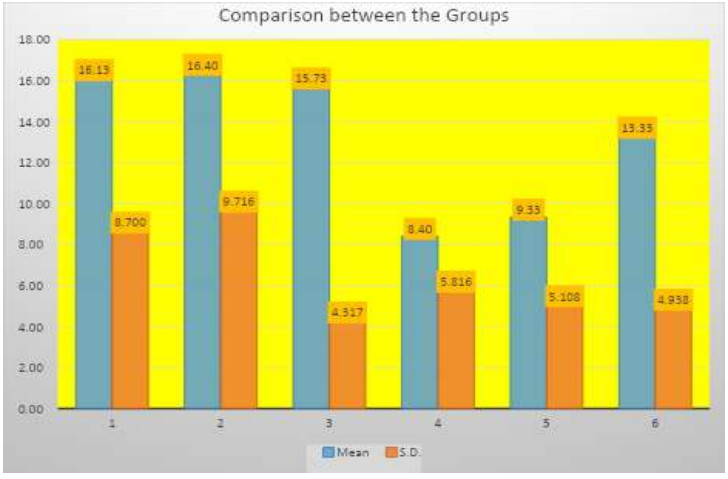

Figure 3: Graphical representation of analysis of NDI between groups A, B and C

Discussion

The aim of the study was to evaluate the effectiveness of Myofascial Release (MFR) and Muscle Energy Technique (MET) on the scalene and levator scapulae muscles in managing neck pain and disability among patients with mechanical neck pain. The findings of the present study are supported by various

previous studies in the literature. Sweta V. Gauns et al. (2018)[1] showed the effectiveness of gross myofascial release (MFR) in managing mechanical neck pain (NP) was investigated. The study concluded that gross myofascial release of the neck and upper limbs into standard physiotherapy regimens is a highly effective therapeutic strategy for individuals suffering from mechanical neck pain. Zainab Khalid Khan et al. (2022)[2] evaluated the effectiveness of Post-Isometric Relaxation (PIR) versus Myofascial Release (MFR) therapy in the management of non-specific neck pain. The study concludes that both techniques are beneficial in managing non-specific neck pain, but Post-Isometric Relaxation demonstrated superior overall outcomes in terms of pain relief, disability reduction, and quality of life. Apoorva Phadke et al. (2016)[4] aimed to compare the effectiveness of Muscle Energy Technique (MET) and static stretching in alleviating pain and functional disability in individuals with mechanical neck pain. In conclusion, the study affirmed that while both MET and static stretching are beneficial, Muscle Energy Technique is superior in reducing pain and improving functional outcomes in patients when administered over a short-term intervention period. Silvia Sbardella et al. (2021)[18] examined the effectiveness of Muscle Energy Technique (MET) in managing chronic mechanical neck pain, this study supports the use of MET as a beneficial adjunct to rehabilitation.

Future scope

The study can be replicated for other muscle groups. The study can be conducted on different population, performed with other techniques for better results. Other objective assessment tools can be added. The same interventions can be done on other specific areas of neck pain.

Conclusion

The study concluded that myofascial release technique is far better and shows better results as compared to muscle energy techniques. However, muscle energy technique also proves improvement in relieving pain and improving disability in patients with mechanical neck pain.

Reference

1. Gauns SV, Gurudut PV. A randomized controlled trial to study the effect of gross myofascial release on mechanical neck pain referred to upper limb. Int J Health Sci (Qassim). 2018 Sep-Oct;12(5):51-59. PMID: 30202408; PMCID: PMC6124822.
2. Khan ZK, Ahmed SI, Baig AAM, Farooqui WA. Effect of post-isometric relaxation versus myofascial release therapy on pain, functional disability, rom and qol in the management of non-specific neck pain: a randomized controlled trial. BMC Musculoskelet Disord. 2022 Jun 13;23(1):567. doi: 10.1186/s12891-022-05516-1. PMID: 35698187; PMCID: PMC9190112.
3. Yadav H, Goyal M. efficacy of muscle energy technique and deep neck flexors training in mechanical neck pain- a randomized clinical trial. International Journal of Therapies and Rehabilitation Research. 2015;4(1):52.
4. Phadke A, Bedekar N, Shyam A, Sancheti P. Effect of muscle energy technique and static stretching on pain and functional disability in patients with mechanical neck pain: A randomized controlled trial. Hong Kong Physiotherapy Journal. 2016 Dec;35:5–11.
5. Alfawaz S, Lohman E, Alameri M, Daher N, Jaber H. Effect of adding stretching to standardized procedures on cervical range of motion, pain, and disability in patients with non-specific mechanical

neck pain: A randomized clinical trial. Journal of Bodywork and Movement Therapies. 2020 Jul;24(3):50–8.

6. Kazeminasab, S., Nejadghaderi, S.A., Amiri, P. *et al.* Neck pain: global epidemiology, trends and risk factors. *BMC Musculoskelet Disord* **23**, 26 (2022). https://doi.org/10.1186/s12891-021-04957-4
7. Bland JH, Boushey DR. Anatomy and physiology of the cervical spine. Seminars in Arthritis and Rheumatism. 1990 Aug;20(1):1–20.
8. Masaracchio M, Kirker K, States R, Hanney WJ, Liu X, Kolber M. Thoracic spine manipulation for the management of mechanical neck pain: A systematic review and meta-analysis. PloS One [Internet]. 2019;14(2):e0211877. Available from: https://pubmed.ncbi.nlm.nih.gov/30759118/
9. Darivemula SB, Goswami K, Gupta SK, Salve H, Singh U, Goswami AK. Work-related Neck Pain Among Desk Job Workers of Tertiary Care Hospital in New Delhi, India: Burden and Determinants. Indian J Community Med. 2016 Jan-Mar;41(1):50-4. doi: 10.4103/0970-0218.170967. PMID: 26917874; PMCID: PMC4746955.
10. Namvar, H., Olyaei, G., Moghadam, B.A., & Hosseinifar, M. (2016). Effect of myofascial release technique on pain, disability, maximum isometric contraction of the extensor muscles, and pressure pain threshold in patients with chronic nonspecific neck pain: Double blinded randomized clinical trial. *International Journal of Medical Research and Health Sciences, 5*, 500-506.
11. Gurudut, Peeyoosha & Welling, Aarti. (2014). Effect of Gross Myofascial Release of Upper Limb and Nesck on Pain and Function in Subjects with Mechanical Neck Pain with Upper limb Radiculapathy - A Clinical Trial. Journal of International Dental and Medical Research. 1. 8-16.
12. Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J, Peloso PM, Holm LW, Côté P, Hogg-Johnson S, Cassidy JD, Haldeman S. Treatment of Neck Pain: Noninvasive Interventions: Results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. Eur Spine J. 2008 Apr;17(Suppl 1):123–52. doi: 10.1007/s00586-008-0631-z. Epub 2008 Mar 4. PMCID: PMC2271098.
13. Sbardella S, La Russa C, Bernetti A, Mangone M, Guarnera A, Pezzi L, Paoloni M, Agostini F, Santilli V, Saggini R, Paolucci T. Muscle Energy Technique in the Rehabilitative Treatment for Acute and Chronic Non-Specific Neck Pain: A Systematic Review. Healthcare (Basel). 2021 Jun 17;9(6):746. doi: 10.3390/healthcare9060746. PMID: 34204590; PMCID: PMC8234422.