Innovative Analysis of Myofascial Trigger Release Versus Muscle Energy Techniques on Range of Motion in Text Neck Syndrome using AI– Powered KemtAI Software

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Abstract. Abstract. The new trend in the healthcare business of AI-driven telemedicine combines the opportunities of ML for remote patient therapy, the use of built-in artificial intelligence algorithms enables accurate diagnosis, designing of unique patient plans, and efficient patient monitoring while providing telemedi-cine as a remote care service. It aims to explore the current intersection of telemedicine and AI in relation to the use of real-time diagnostics, patient monitoring, and health data analysis PA considerations. The process will involve analyzing the current practices in the integration of AI algorithms into the Tm, as well as how these algorithms affect the population. The outcomes demonstrate mutual maximization of the benefits of the solution, such as increase in the quality of remote treatment, decrease in inpatient treatments to patients, and increase in the interactivity. The concluding section of the study is ded-icated to potential threats and further develop-ment of AI into telemedicine solutions, as well as the significance of ethical guidelines and secure data protection.

Keywords: Myofascial trigger release technique, Muscle Energy Technique, KemtAi Software, Electromyography (EMG).

1 Introduction

Text neck syndrome is a form of repetitive stress injury brought on by extended neck flexion at different angles and pain from using portable electronics for chatting or binge-watching all day. "TEXT NECK" was first used by American chiropractor Dr. Dean L. Fishman. This expression refers to upper back muscular injuries and neck pain caused by often extending the neck at different angles while looking down at a phone, which changes the cervical spine's natural curve. The term "Pain of the Modern Era" best describes Text Neck Syndrome, which is a condition that causes acute to chronic neck and upper back pain that is brought on by contemporary technology like computers, smartphones, and other smart devices. The model projection at 90 degrees is inaccurate, according to a report, and the pressures pushing on the neck rise with the head flexion angle: At 15 degrees, 27 pounds; 40 pounds at 30 degrees; 49 pounds at 45 degrees; and 60 pounds at 60 degrees. The most popular and widely used device these days for a variety of daily activities, such as using social networking sites, playing games, watching movies, accessing the internet, and exchanging information, is the cell

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phone. 79% of adults between the ages of 18 and 44 report using their smartphones for work most of the time, per a survey.[1] There has been a growing body of evidence in recent years that suggests "Text Neck Syndrome" might be a 21st-century ailment. This clinical condition is characterized by the onset of cervical spinal degeneration caused by the repeated stress of bending our heads forward when staring down at our phones or during extended periods of "texting." Teenagers are more likely to develop text neck syndrome because they are hunching over smartphones and computers more often than they used to be, often for several hours each day and several days a year. 75% of people on the planet are thought to spend hours each day slumped over their mobile devices with their necks cocked forward.[2] The world in which we live is expanding daily. The state of the globe and technology in fifty years is beyond our comprehension. It simplifies and improves the comfort of our lives while saving us time. Nevertheless, we are becoming dependent on technology more and more. They were designed primarily for communication, much like cell phones, but they gained a ton of versatility over time. These days, it serves a variety of functions. We eventually grew dependent on it after allowing it to become a significant portion of our lives.

Nomophobia is a phobia that some people got as a result of their increased addiction. The definition of it is the anxiety of being separated from one's cell telephone. Some people have been seen engaging in harmful or compulsive mobile phone habits, include communifaking, phubbing, and continuous phone monitoring. Nomophobics are those who exhibit compulsive behaviors related to their mobile phones. Over-reliance on smartphones impacts mental, physical, and social well-being negatively. They experience a range of negative emotions such as anger, disappointment, stress, irritation, anxiety, fear, and various psychological issues when they misplace their phone or experience a lack of battery and internet connection. This dependency leads to a reduction in physical exercise, resulting in weakened physical condition. They begin to experience various physical issues like muscle tightness, pain in arms, legs, neck, and back, headaches, and eye strain. Additionally, it can lead to digestive problems, decreased energy levels, weight gain, and other health issues.[3] Those who have Text Neck Syndrome usually experience soreness, upper back pain, and neck pain. It can cause severe upper back muscle spasms and chronic, acute, lingering pain over time.

Text Neck Syndrome is mostly caused by improper posture, which weakens the cervical muscles, especially the deep cervical flexors, by increasing tension on those muscles. Because their neck muscles are weaker and less resilient, people with Text Neck Syndrome have abnormal postures. Long-term, serious harm from undiagnosed and untreated text neck can include flattening of the spinal curvature, early onset of arthritis, misalignment, degeneration, disc compression, herniated discs, nerve or muscle damage, cervical ligament inflammation, nerve irritation, and more.[4] The defining elements of myofascial pain are myofascial trigger points, which have components related to the motor, sensory, and autonomic nervous systems. The motor features of both active and latent myofascial trigger points can include impaired motor function, stiffness, limited range of motion, and muscular weakness brought on by motor inhibition. Peripheral and central sensitization, referral of pain to a remote location, and local discomfort are examples of sensory components.[5]

Myofascial release affects these fascial changes, which is why treating chronic pain with it is advised. The goals are to reduce discomfort, lengthen muscles to their ideal length, enhance function, and ease myofascial system tissue sensitivity. MFR entails treating a single patient at a time with a single therapist stretching the myofascial tissue barriers for an extended period of time with little strain.[6] MET is an active manual treatment where the corrective force is not controlled by the physiotherapist. Actually, the patient ought to be able to execute focused, variable-intensity voluntary contractions. Greenman PE (1989) stated that the three types of muscle contractions that should be done in MET are isometric, concentric, and eccentric contractions. Consequently, the reduced range of motion of any articulation is improved by manual therapy.

By promoting regular muscle contractions, this method can treat muscular weakness or contractures and lessen localized oedema. Through localized vasodilatation and fascial stimulation, MET lowers sympathetic tone. After that, the patient can contract the muscle isometrically and release it post-isometrically. Furthermore, MET causes reciprocal agonist muscle inhibition. [7]

The current study used the surface electromyography to evaluate the muscle activity of neck muscles, ROM is measurable with KEMTAI software for the individuals with text neck syndrome. Surface electromyographic recordings are often used in the investigation of muscle activity in occupational tasks. Because prolonged muscle activity is known to generate ischemic muscular discomfort, using electromyography to assess muscle activity can shed light on patterns of tension or activation that have established in the muscles. It has been demonstrated that continuous contractions can cause localized muscle fatigue even with joint stresses as little as 5% of maximal capacity.

Therefore, it is relevant to research muscular activity during tasks that are anticipated to be low, such using a computer or doing minimal assembly work. Moreover, muscle activation patterns can be utilized as input into models to obtain estimates of muscle tension and loads in other tissues that are unique to an individual or as a means of testing the hypotheses of biomechanical models [8]. In routine clinical practice, range of motion measurement is an essential duty to accurately analyse the benefits of therapy. The KEMTAI software system is a cutting-edge tool for clinical practice and functional evaluation that uses a camera to track and analyse human movement. The system can assess postures, track and assess the body's joints' range of motion, as well as identify specific anatomical landmarks to deliver real-time, personalized feedback depending on the required movement patterns. This study's particular objectives are to assess the effectiveness of muscular energy and myofascial trigger release treatments in treating Text Neck Syndrome and to find out how participants with the condition are regularly impacted in their everyday life.

2 Methodology

A total of 112 individuals with text neck syndrome were chosen from Saveetha Medical College and Hospital using basic random sampling techniques according to inclusion and exclusion standards. Following a comprehensive description of the study's

methods, patients provided signed informed consent. The people, who were male and female, had been diagnosed with text neck syndrome and were between the ages of 18 and 30. Two groups of 56 people each were formed. Pretest data for both groups were recorded using EMG and ROM. The experimental group used the myofascial trigger release technique, whereas the control group used the muscle energy approach. The course of treatment lasted four weeks, with three sessions per week.

Inclusion Criteria: Subject with neck pain, Subject spend an average of 3 to 4 hours daily in using mobile phones, Age group: 18 to 30 years, Both Male and Female students.

Exclusion Criteria: Neck injury, Osteoporosis, Cervical spondylosis, Postural disorders, Cervical spondylolisthesis, Recent spinal fracture, Recent cervical surgery, Hyper mobility of joint.

2.1 Outcome Measures

- **Primary outcome:** ROM using KEMTAI software
- **Secondary outcome:** Electromyography

3 Procedure and Intervention

3.1 Experimental Group: Myofascial Trigger Release Technique

The therapist glided her left hand beneath the patient's head, positioned herself behind her head, and touched her upper trapezius with her index finger. They put the patient in a supine position. Using the thumb of the right hand, stretch the upper trapezius region diagonally downward on the neck. Hold, release, and then once again extend the neck area. Keep the touch while you stretch outward and downward, along the muscular fibers' arc. Waiting for release, holding, then extending once more.

Continue the release technique until the patient's head is in the midline and the entire upper trapezius has been released, bringing the thumb further down the shoulder portion of the muscle.[9] After applying deep transverse friction for ten minutes, the upper trapezius muscle was myofascially stretched three times, with a 90-second hold in between. The patient was sitting comfortably in a chair with both feet planted firmly on the ground. The left thumb was used to reinforce the upper portion of the body, while the right thumb was used to progressively apply friction to the major trigger point. The therapist then applied myofascial release use both hands' ulnar borders to reach the upper trapezius. The patient's cervical spine was bent to the other side at that moment.[10]

3.2 Control Group: Muscle Energy Technique

The practitioner holds the ipsilateral ear/mastoid area with one hand while stabilizing the shoulder with the other when the patient is supine, with their arm resting alongside the trunk and their head/neck side-bent away from the side being treated to just short of the restriction barrier. When the flexed neck is completely side-bent and turned in the

opposite direction, the posterior fibers of the upper trapezius contract. Later on, it will be simpler to extend this specific muscle group. The middle muscles tense when the neck is fully bent to one side and partly rotated. When the flexed neck is fully side-bent and rotates slightly in the direction of the side being treated, the anterior fibers of the upper trapezius are stimulated. By crossing their arms and stabilizing their shoulder and mastoid region with their hands, the practitioner can perform the various contractions and stretches. The patient uses a small amount of resistance (20% of their available strength) to move the stabilized shoulder toward the ear (a shrug action) and the ear toward the shoulder. The opposite effort toward movement is required to generate a synchronized contraction of the muscle from both ends. There should be minimal effort involved and no discomfort. The practitioner should caudally stretch the shoulder after maintaining this contraction for seven to ten seconds. They should progressively ease them into a more pronounced degree of side bending and rotation after stabilizing the head and neck. When instructed to do so, the patient can help initiate the muscle stretch during this part of the therapy (for instance, "while you breathe) [11].

4 Statistical Analysis

The data collected was recorded and examined. For each parameter, the standard deviation (SD) and mean were calculated. An analysis of to ascertain whether there were noteworthy variations between the variables prior to and following the test, the paired t-test was employed. An unpaired t-test was used in the study to look into any significant differences between the two groups. P-values were deemed statistically significant if they were less than 0.001. Table 1 show the comparing clinical outcomes post-test values between groups.

Table 1. comparing clinical outcomes post-test values between groups.

Parameters	Post-test values		T-Value	P-Value
	Experimental group	Control group		
EMG	874.11	788.53	8.54	<0.0001
ROM using KEMTAI	79.57	75.07	7.24	<0.0001

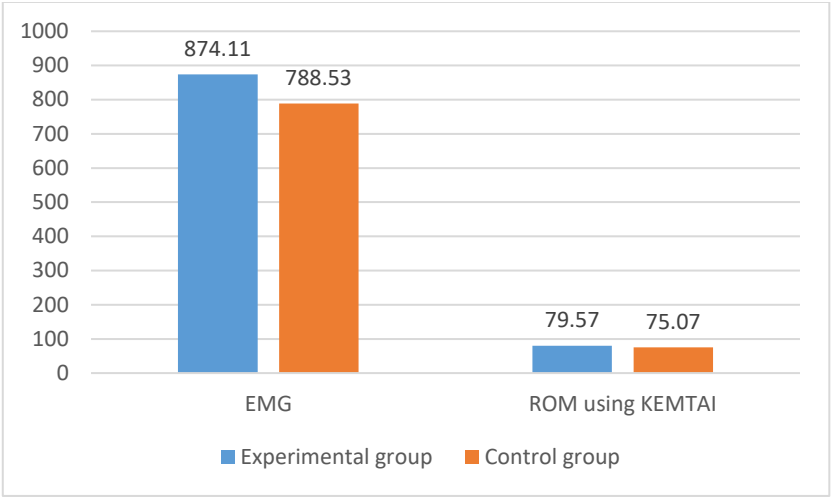

Fig. 1. Post test values of control and experimental group.

5 Results and Discussion

A statistical study of the quantitative data revealed a statistically significant change in both groups' values. Table 1 shows the experimental group's (874.11) and control group's (788.53) EMG post-test mean values. With a P-value below 0.0001, the outcome is considered highly statistically significant. Both groups of text neck syndrome subjects show some improvement in their muscle activation and range of motion. According to the table 1, resulted that the experimental group is more effective than the control group on muscle activity and ROM among the subjects with text neck syndrome. Based on the statistical data analysis.

In this study, the effects of myofascial trigger release and muscular energy techniques on the range of motion and muscle activity of individuals afflicted with text neck syndrome are compared. This study demonstrates that Electromyography (EMG) score in terms muscle activity, the Myofascial Trigger Release Technique (Experimental Group) has higher statistical significance compared to Muscle Energy Technique (Control Group), and Range of motion using KemtAi software, Myofascial Trigger Release Technique (Experimental Group) has higher significance compared to Muscle Energy Technique (Control Group).

Sonia Pawaria et al 2015 has clarified that The myofascial releases technique is utilized to relax the fascia limitation that is applying pressure to the fibrous band of connective tissue. The cervical spine's range of motion, discomfort, and impairment were all improved more by the using a heat pack in conjunction with myofascial release technique as opposed to just stretching muscles. By dilatation of capillaries and increased blood flow to the muscle, it lowers pain, tension in the muscles, and improves range of motion by increasing the clearance of waste products that stimulate nociceptors pain fibers [9].

Nipa patel et al 2021, explains that there was no discernible difference in the patients' neck pain and neck impairment between the effects of Therapy using Positional Release Technique and Muscle Energy Technique. As a result, both methods are applicable in clinical settings [11].

Neeraj kumar et al 2021, has clarified that both positional release method and myofascial release technique are beneficial in reducing pain and impairment, as demonstrated by the immediate impacts of cervical range of motion, NDI score, and discomfort on a VAS scale in students with trapezitis; however, there was no appreciable change in the post-intervention cervical ranges of motions among college-bound individuals with trapezitis because baseline cervical ranges in both groups stayed constant[12].

Ravish V N et al 2014, This comparative study examined the relative efficacy of Positional Release Technique with LASER and Myofascial Release Technique with LASER in treating trapezitis. Range of motion, functional restriction, and pain reduction were significantly improved in both groups. However, MRT with LASER has made better improvement than PRT with LASER when individuals in the two groups are compared [13].

Harshita yadav et al 2015, The effects of MET on pain and tenderness are little understood, even though it is frequently recommended for the management of pain and somatic dysfunction.The MET group's pain outcomes aligned with the previous study's conclusions that following therapy, pain in the neck and other body parts diminished [14].

Senthilkumar Murugapillai et al 2021, explains that the study's main objective was to ascertain whether the newly created Compared to conventional neck exercises, the Myofascial Release Technique was more successful in reducing neck discomfort and disability in females with cervicogenic headaches. The study's applicability is limited because it only included female subjects, even though males are also susceptible to the disease. According to the study's results, myofascial release therapy is more beneficial for the suboccipital muscles than conventional neck workouts [15].

There are a few constraints to keep in mind. Because of the study's small sample size, the results may not be as broadly applicable as they may potentially. Long-term impacts were not evaluated, and the trial had a brief length. The results may not be broadly applicable due to the tiny sample size. To give a more thorough understanding of its role in treating Text neck syndrome, future research might examine its impact on various patient populations as well as how it interacts with other therapeutic techniques.

6 Conclusion

The current study found that patients with text neck syndrome experienced significant improvements in their EMG and range of motion after four weeks of using the Myofascial Trigger Release Technique and Muscle Energy Technique. Superiority of Myofascial Trigger Release Technique has showed improvement by using EMG than the Muscle Energy Technique. Based on the result obtained in this study Myofascial

Trigger Release Technique shows more improvement in muscle activity and Range of motion among Text Neck Syndrome Patients than the Muscle Energy Technique.

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References

1. Kumari S, Kumar R, Sharma D. Text neck syndrome: the pain of modern era. Int J Health Sci Res. 11(11): 161-165, https://doi.org/10.52403/ijhsr.20211121, 2021.
2. David D, Giamnini C, Chianelli F Mhon, A Text Neck Syndrome in children and adolescent. International Journal of Environmental Research Public Health 18-1565 https://doi.org/10.3390/ijerph18041565, (2021)
3. Kumar R, Kumari S, Bharti P, Sharma D. Nomophobia: A rising concern among Indian students. Indian Psychiatry J 2021. DOI: 10.4103/ipj.ipj_134_21
4. Effectiveness of Pilates along with Conventional Exercise Program and Conventional Exercise Program Alone in Subjects with Text Neck Syndrome. Article in International Journal of Science and Research (IJSR) · March DOI: 10.21275/SR21322101821, 2021.
5. Comparing Effectiveness of Myofascial Release and Muscle Stretching on Pain, Disability, and Cervical Range of Motion in Patients with Trapezius Myofascial Trigger Points Sonia Pawaria, Sheetal Kalra. Indian Journal of Health Sciences and Care Vol. 2, No. 1, April 2015, pp- 8-13 DOI: 10.5958/2394-2800.2015.00002.4
6. Effectiveness of myofascial release for adults with chronic neck pain: a meta-analysis Lea Overmann, Robert Schleip, Dennis Anheyer, Johannes Michalak https://doi.org/10.1016/j.physio.2023.12.002
7. Sbardella, S.; La Russa, et al. Muscle Energy Technique in the Rehabilitative Treatment for Acute and Chronic Non-Specific Neck Pain: A Systematic Review. Healthcare, 9, 746. https://doi.org/10.3390/healthcare9060746, 2021.
8. Carolyn M Sommerich, Sharon M.B Joines, et al. Use of surface electromyography to estimate neck muscle activity https://doi.org/10.1016/S1050-6411(00)00033-X
9. Sonia Pawaria, Sheetal Kalra Comparing Effectiveness of Myofascial Release and Muscle Stretching on Pain, Disability, and Cervical Range of Motion in Patients with Trapezius Myofascial Trigger Points. Indian Journal of Health Sciences and Care. Vol 2, pp- 8-13,
10. Chaudhary ES, Shah N, Vyas N. Comparative study of myofascial release and cold pack in upper trapezius spasm. Int J Health Sci Res. 2013;3(12):20-27, (2015).
11. Nipa Patel, Sonali Desai, Priyanshi Patel Effectiveness of Muscle Energy Technique versus Positional Release Technique on Upper Trapezius Trigger Points in Subjects with Neck Pain Comparative Study. International Journal of Current Research and Review, IJCRR.2021.131110, (2021).

12. Sai Vispute, Neeraj Kumar, A Comparative Study of Immediate Effects of Myofascial Release Technique and Positional Release Technique on Trapezitis Among College Students, International Journal of Physiotherapy and Research, ISSN (P) 2321-8975. DOI: https://dx.doi.org/10.16965/ijpr.2022.122, (2021).
13. Ravish V. N, Shridhar, Sneha Helen, To Compare the Effectiveness of Myofascial Release Technique versus Positional Release Technique with Laser in Patients with Unilateral Trapezitis. Journal of Evolution of Medical and Dental Science, Vol. 3 / Issue 09 / 2014
14. Harshita Yadav, Manu Goyal, 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 (E-ISSN: 2278-0343) 2014. DOI: 10.5455/ijtrr.00000048
15. Senthilkumar Murugapillai, Thiagarajan Subramanian, The Effects of Myofascial Release Technique on Pain and Neck Disability Over Conventional Neck Exercises in Patients with Cervicogenic Headache, Indian Journal of Natural Sciences, Vol.12/ Issue 65/ April 2021.

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