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Effectiveness of Muscle Energy Technique Versus Deep Transverse Friction Massage on Trapezitis

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Abstract

Background: Trapezitis frequently manifests clinically as neck pain, restricted range of motion in the neck and shoulder girdle, guarding/tightness of the muscles, and functional impairment. Physical therapy, which includes a variety of passive and active treatments, has gained popularity in the last three decades as a means of treating neck pain. Positional Release Therapy, Myofascial Release, Dry Needling, Taping, Passive Stretching, Trigger Point Release, Muscular Energy Techniques, Cyriax Techniques, And Postural Correction Exercises.

Objective: This study aims to determine the effect of Muscle Energy Technique versus Deep Transverse Friction Massage on Pain, Range of Motion, and Neck Disability Functions among adult patients with trapezitis

Methods: A Quasi-experimental study was conducted at a single center, involving 45 patients diagnosed with trapezitis. All 45 patients were allocated in the 1:1:1 method in a 3-arm study. Both at baseline and two weeks after the interventions, outcome measures, such as the Numerical Pain Rating Scale (Pain), Baseline Goniometer (Range of Motion), and functional disability (Neck Disability Index) were assessed.

Result: At baseline, no statistically significant differences were detected between the MET, DTFM, and control group with any outcome measure. The effect size of NPRS (5.600), NDI (26.889) and Lateral flexion of Right (-19.578) left (-19.000) with marginal improvements observed during the two-week follow-up in pain, functional disability, and cervical range of motion in all 3 groups.

CONCLUSION: The study revealed that the use of muscular energy technique and deep transverse friction massage resulted in a decrease in pain, improvement in functional impairment, and an increase in cervical range of motion. Nevertheless, MET is superior to deep transverse friction massage in its efficacy for treating trapezitis for the outcomes measured in this trial.

Introduction

According to the GBD 2019(1), neck pain is one of the most common spinal conditions, affecting 42% to 67% of adults. Neck pain is said to be the second most common cause of years lived with disability (YLD), after low back pain. Trapezitis is one of the many non-traumatic musculoskeletal conditions that frequently manifest clinically as neck pain. People who experience neck pain associated with trapezitis typically report pain, restricted range of motion in the neck and shoulder girdle, guarding/tightness of the muscles, and functional impairment(2). According to published research, there is a complex relationship between a number of factors and conditions related to neck pain, including health status, co-morbid conditions,

posture, job-related factors, physical and psychological stress, and socioeconomic and demographic characteristics. The trapezius muscle is regarded as a postural muscle, and its upper fiber in particular is crucial for preserving the neck's erect posture(3). When this muscle is subjected to excessive stress or strain, the muscle fiber becomes inflamed, causing pain and shortening the fiber, which alters the neck's biomechanical posture. This leads to the inflammation of the muscle fiber known as trapezitis, which is very prone to overuse injuries(4).

When pain and spasm levels are greater, NSAIDS (Non-Steroidal Anti Inflammatory Drugs) are an effective treatment for trapezitis. Over the past three decades, physical rehabilitation has become more and more popular in the management of neck pain conditions. This has led to the development, application, and efficacy testing of numerous passive and active physical rehabilitation techniques. Positional release therapy, myofascial release, dry needling, taping, passive stretching, trigger point release, muscle energy techniques, cyriax techniques, postural correction, exercise, and effective electrotherapy modalities like ultrasound, laser, TENS (Transcutaneous Electrical Nerve Stimulation), shock wave therapy, and interferential therapy are the physical interventions employed to treat trapezitis. Application and outcome of Muscle Energy Technique (MET) is most often determined by factors like therapist skills set and patients understanding of commands(5). Deep Transverse Friction Massage (DTFM)(6) (passive) among trapezitis has been reported to alleviate pain but functional recovery from this treatment option is conflicting.

The knowledge of which modality has effective intervention response in improving function is also paramount. Hence this study was conducted to evaluate the effectiveness of MET, DFM, and combination of MET and DFM. In addition, this study determined the effect size of the interventions when delivered separately and in combination in alleviating pain and improving contra lateral flexion and rotation.

Materials and Methods

The study was granted ethical approval by the ethical committee. 2879/IEC/2021 is the ethical clearance number. The study comprised individuals aged 25 to 45 year, who had been experiencing symptoms of trapezitis for over a week, with pain intensity ranging from 4 to 7 on the NPRS and limited cervical range of motion. A patient's history of cervical degenerative condition, neurological impairment, vascular abnormalities, recent surgery, fractures, metal implants, malignancy, hypermobility, or receipt of alternative therapies such as acupressure or dry needling precluded them from participation.

Study design and allocation

A 3 arm pre post experimental (intervention) design was conducted with a 1:1:1 with allocation ratio by recruiting eligible participant with a clinical battery of trapezitis.

Study settings

Conveniently, participants seeking medical attention at the SRM Medical Hospital and Research Institute's orthopedic and outpatient physiotherapy departments were recruited. Prospectively, eligible individuals were assigned at random to one of the three groups. This study was designed as a quasi-experimental, disguised envelope study with a sample size of 45 that ran for six months.

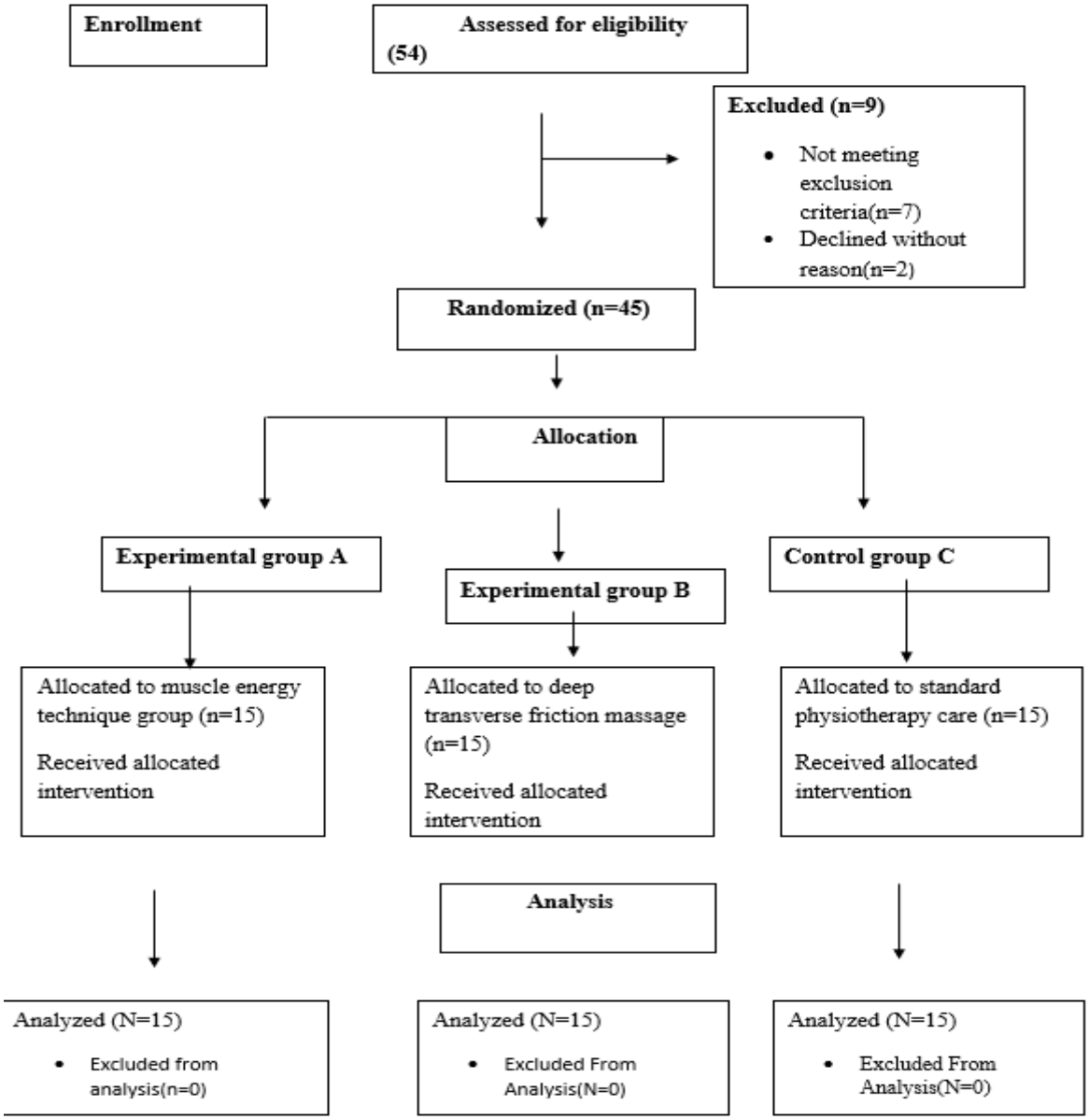
Participants and recruitment

Based on the inclusion and exclusion criteria, participants were chosen. Those who satisfied the requirem-

ents for inclusion were divided into three groups at random: A, B, and C. The subjects were invited to participate, and after being informed about the goal, methodology, risks, rewards, opportunity to withdraw, and guarantee that the study would remain anonymous, their permission was obtained. Group A, B, and C was randomly assigned to the subjects. Along with ultrasound therapy, Group A (15 individuals) received the muscular energy method, Group B (15 subjects) received the deep transverse friction massage, and Group C (15 subjects) received ultrasound therapy(7). The intervention was given to the entire group for a period of two weeks. Participants were gathered from the hospital and research center of SRM Medical College. The Neck Disability Index (NDI (8) score was used to evaluate the patient's daily activities while they had neck discomfort and the pre- and post-test pain values were measured using the Numerical discomfort Rating Scale (NPRS). A universal goniometer was used to measure the active range of lateral flexion in the neck. For every group, there has been ergonomic Guidance Provided.

Figure(S) and Table(S)

Study Flow Diagram



RESULT

Table 1: Pre-post test findings of NDI, NPRS and ROM among group A, B and C using paired t test

Group A	**Pre test (Mean (SD))**	**Post test (Mean (SD))**	**Mean difference**	**p value**
NDI	33.7 (5.9)	6.5 (2.5)	27.1	<0.001
NPRS	8 (0.9)	1.6 (0.9)	6.4	<0.001
ROM	23.7 (12.0)	52 (6.8)	28.3	<0.001
Group B				
NDI	34.2 (6.2)	20.4(9.0)	13.8	<0.001
NPRS	8.1 (0.8)	2.8 (0.8)	5.3	<0.001
ROM	29.0 (10.7)	36.6 (7.7)	7.6	<0.005
Group C				
NDI	32.8 (5.4)	27.6 (6.7)	5.2	<0.005
NPRS	8.0 (0.8)	2.8 (0.8)	5.2	<0.001
ROM	20.3(6.9)	29.0 (10.2)	8.6	<0.005

Table 1 shows the findings of NDI, ROM, and NPRS. All the findings showed statistically significant results within each group. Among all groups, Group A (MET) showed a high significance level in all three outcome measures compared to other groups.

Table 2: Post test findings of Group A, B and C using one way ANOVA

NDI	Mean (SD)	p value	Levene's test for homogenecity
Group A	6.5 (2.5)	<0.001	0.005
Group B	20.4(9.0)		
Group C	27.6 (6.7)		
NPRS			
Group A	1.6 (0.9)	<0.001	0.508
Group B	2.8 (0.8)		
Group C	2.8 (0.8)		
ROM			
Group A	52 (6.8)	<0.001	0.177
Group B	36.7 (7.7)		
Group C	29.0 (10.2)		
*Post hoc test performed based on levene's test for Homogenicity (Bonferroni test)			

Table 2 shows the post-test findings of the three groups for NDI, NPRS, and ROM. All post-test values showed statistically significant results for the corresponding outcomes.

Table 3: Post hoc findings of Post test outcome measures among the group A, B and C

	Mean Difference	p value
NDI		
Group A and B	13.9	<0.001*

Group B and C	7.2	0.015*
Group A and C	21.1	<0.001*
NPRS		
Group A and B	1.2	0.001*
Group B and C	0	1.000
Group A and C	1.2	0.001*
ROM		
Group A and B	15.3	<0.001*
Group B and C	7.7	0.048*
Group A and C	23.0	<0.001*

*Statistically significant

Table 3 shows the post-test findings of NDI, NPRS, and ROM for the groups. Except for groups B and C of NPRS, all post-test values showed statistically significant results for the corresponding outcomes.

Discussion

The results of this three-arm parallel experiment, which included patients with trapezitis, demonstrated substantial enhancements in pain levels (measured using the Numeric Pain Rating Scale), range of motion (measured using a gonimeter), and functional activities (measured using the Neck Disability Index)(8). Nevertheless, the muscular energy approach demonstrated enhancements in pain alleviation, augmented cervical range of motion, and improved functional activities among individuals diagnosed with trapezitis. The results of this research provide evidence supporting the short-term benefits (2 weeks) of using muscle energy method and deep transverse friction massage as additional treatments to regular physiotherapy care for patients with trapezitis.

The significant increase in MET may be attributed to factors such as muscular relaxation and changes in the viscoelastic characteristics of the fibers. The activation of the Golgi tendon organ results in muscular inhibition, followed by targeted activation of specific muscle fiber (9). This leads to significant enhancements and also inhibits further contraction of muscle tone, resulting in elongation of the agonist muscle group. The manipulation of confounding factors, including topical treatments, drugs, and self-massage used in this research, in conjunction with the home program, may have impacted the outcomes. Therefore, caution should be exercised when interpreting the data. Therefore, it is difficult to ascertain whether the observed effects in the routine care group are a result of normal temporal fluctuations.

Muscle and joint mechanoreceptors are activated in MET via centralized mediation channels such as the periaqueductal gray (PAG) or non-opioid serotonergic and noradrenergic inhibitory pathways. The features of these inhibitors may affect the motor neurons in the muscles, leading to a decrease in muscular tone or tension. Activation of antagonistic muscles leads to a decrease in muscular tone in the corresponding muscle agonists. The agonist muscle, also known as the spasm muscle, will contract and experience a rapid decrease in tension due to this inhibitory effect. The reduction in muscle tone led to an improvement in joint mobility, perhaps eliminating restrictive obstacles.

A study by Avci et al. (2021)(9) assessed the immediate impact of muscular Energy Technique on the range of motion and isokinetic muscular strength of volleyball players with Gleno-humeral Internal Rotation Deficit. According to the research, a single session of posterior shoulder MET therapy in asymptomatic volleyball players instantly increased the range of motion for internal rotation of the gleno-humeral joint and the maximum force exerted by the internal and external rotators of the GHJ.

The muscle energy technique reduces pain by enhancing the capacity to tolerate stretching. The muscle and joint mechanoreceptor may be engaged by centralized mediation channels, such as the periaqueductal gray (PAG), or through non-opioid serotonergic and noradrenergic inhibitory pathways (Ewan Thomas et al, 2019)(10) A research was conducted to evaluate the efficacy of muscular energy strategies in both symptomatic and asymptomatic individuals. He concluded that MET was efficacious in mitigating acute and chronic lumbar pain. MET may be used for the treatment of chronic lateral epicondylitis and prolonged neck discomfort(11)
. A proposal was made to apply MET as a means to assist patients with functional limitations in improving their range of motion.

Deep Transverse Friction Massage (DTMF): The primary effects of deep transverse friction can be summarized as follows: firstly, it alleviates pain by releasing metabolites; secondly, it mobilizes damaged tissue, preventing the formation of adhesions and enhancing the quality of scar tissue; and thirdly, it stimulates mechanoreceptors, which in turn release a sufficient amount of afferent nerves to induce temporary analgesic effects.(12)

The authors Noureen Farooq et al published a study in 2019(13). Researchers conducted a study on the effects of transverse friction massage and calf muscle stretching on plantar fasciitis using the foot function index scale, which assesses a patient's walking and standing capabilities. When it comes to (14)treating plantar fasciitis, deep transverse friction massage and calf muscle stretching are equally helpful, according to the author. The participants, who had conventional treatment, including ultrasound therapy, also saw improvements in outcome evaluations. However, the magnitude of these changes was not as substantial as those seen in the other two groups(14). In addition to MET and DTFM, ultrasound treatment was used. It is often used for the treatment of soft tissue injuries. By boosting blood flow to the injured region, removing waste products, and promoting tissue permeability and tissue healing, these physiological activities on tissue help repairing and rebuilding the damaged tissue (15). Additionally, it reduces muscular spasms and enhances tissue extensibility by promoting the proliferation of collagen fibers.

Likewise, Yildirim, M et al (2018)(15) performed a randomized, single-blind, placebo-controlled experiment to assess the efficacy of ultrasound treatment in treating upper trapezius myofascial pain syndrome. He determined that the conventional therapeutic approach for myofascial pain syndrome in the United States is beneficial. The statistical analysis of the study demonstrated enhancements in outcome measures for all three groups. However, notable disparities were seen between patients who underwent muscular energy method compared to those who got deep transverse friction massage or regular physiotherapy

Conclusion

The study revealed that the use of muscular energy technique and deep transverse friction massage resulted in a decrease in pain, improvement in functional impairment, and an increase in cervical range of motion. Nevertheless, MET is superior to deep transverse friction massage in its efficacy for treating trapezitis for the outcomes measured in this trial.

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