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The Difference in The Effects of Muscle Energy Technique Versus Ischemic Compression on The Reduction of Upper Trapezius Myofascial Syndrome Pain in Employees at The Education Office of South Sulawesi Province

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Abstract

Aim: Upper trapezius myofascial pain syndrome (MPS) is a common musculoskeletal disorder among office workers, primarily resulting from prolonged static postures and poor ergonomic habits. Muscle Energy Technique (MET) and Ischemic Compression (IC) are widely used physiotherapy interventions for MPS; however, evidence directly comparing their effectiveness remains limited. This study aimed to compare the effectiveness of MET and IC in reducing pain intensity among employees with upper trapezius MPS.

Methods: This quasi-experimental study employed a two-group pre-test–post-test design. Twenty-six employees diagnosed with upper trapezius MPS at the South Sulawesi Provincial Education Office were recruited using a total sampling technique and equally allocated into two intervention groups (n = 13 per group). Group 1 received MET, while Group 2 received IC. Pain intensity was assessed before and after the intervention using the Visual Analog Scale (VAS). Data normality was evaluated using the Shapiro–Wilk test. Within-group differences were analyzed using paired-samples t-tests, and between-group differences were assessed using independent-samples t-tests.

Results: Both interventions produced significant reductions in pain intensity following treatment (both $p < 0.001$). The independent-samples t-test demonstrated a significant difference in treatment effectiveness between the two groups ($p < 0.001$). The mean reduction in pain was greater in the MET group (4.008) than in the IC group (2.077), indicating superior pain relief with MET.

Conclusion: Both Muscle Energy Technique and Ischemic Compression were effective in reducing pain associated with upper trapezius myofascial pain syndrome. However, Muscle Energy Technique demonstrated significantly greater effectiveness than Ischemic Compression and may therefore be considered the preferred physiotherapy intervention for pain management in individuals with upper trapezius MPS.

Keywords: Ischemic Compression; Muscle Energy Technique; Myofascial Syndrome; Upper Trapezius

Introduction

Prolonged use of gadgets and laptops in an ideal body position, such as a forward head posture, has the potential to cause Myofascial Pain Syndrome in the upper trapezius muscle. This condition is often experienced by students and office workers. Chronic muscle tension can develop into MPS, a persistent muscle pain disorder characterized by hypersensitive points (trigger points) in the tense muscle or fascia, which can then lead to muscle spasms and stiffness [1]. Myofascial Pain Syndrome is a chronic muscle pain characterized by the presence of trigger points, which are sensitive areas in muscles that are tense or hardened. The main triggers can be excessive muscle workload or trauma. Overloading causes continuous muscle contractions, which triggers tension, spasms, stiffness, tissue adhesion, and reduced blood circulation. These conditions encourage the formation of trigger points [2].

According to the International Association for the Study of Pain (IASP), pain is an uncomfortable physical and emotional experience caused by actual or potential tissue damage. In MPS, excessive muscle activity triggers prolonged contractions, leading to decreased blood flow, local hypoxia, and nociceptor stimulation, which in turn causes pain and facilitates the formation of trigger points [3].

Myofascial pain syndrome is a non-inflammatory musculoskeletal disorder characterized by pain and muscle stiffness, but it is often underdiagnosed. A trigger point is a hypersensitive spot within muscle fibers that feels painful when pressure is applied, stretched, or overloaded, and can radiate pain to other areas. The etiology of myofascial pain syndrome includes direct or indirect trauma, spinal pathology, cumulative and repetitive stress exposure, postural dysfunction, and psychological stress. An example is muscle overload from daily activities or repetitive work, such as lifting heavy weights [4].

Neck pain is often experienced by workers who perform repetitive, fast-paced movements without sufficient recovery time. A prolonged head-down position can trigger muscle spasms and tension, resulting in neck pain and limited range of motion [5]. Sitting in front of a computer screen for more than five hours a day significantly increases the risk of neck pain, with a probability as high as 95% [6]. The prevalence of neck pain increases with age and is more common in women than in men (a ratio of 1.67:1). Approximately 67% of adults aged 20–69 years experience neck pain. In Indonesia, 16.6% of the adult population reports neck discomfort, with 0.6% experiencing severe clinical pain. Among workers, the prevalence of MPS ranges from 6–67%, with monthly occurrences at 10% and annual occurrences up to 40% [7]. Globally, 45–54% of the population experiences mechanical pain that can lead to work or school absenteeism, and even disability [8]. Based on observations conducted through interviews and examinations by researchers at the South Sulawesi Provincial Education Office in the Program and Special Fields in November 2024, 26 employees were found to have Myofascial Syndrome. All these employees work in front of a computer for a normal duration of approximately 8 hours every day. The interventions that will be used to address this condition are Muscle Energy Technique (MET) and Ischemic Compression (IC), with the aim of reducing pain in employees suffering from Myofascial Syndrome. MET is a soft tissue mobilization technique that utilizes isometric muscle contractions to restore muscle length and improve limited joint function due to muscle shortening [7]. Research by Suharto Anwar et al. [6] and Pradita [9] showed that MET is effective in reducing upper

trapezius muscle pain because it affects interstitial pressure, increases transcapillary blood flow, and stimulates muscle and joint receptors to provide a relaxation response. Meanwhile, Ischemic Compression is a technique of sustained pressure on trigger points to reduce nodules, tension, pain, and muscle sensitivity. Research by Dadan Prayogo et al. found that this technique is equally effective as myofascial release in reducing pain and disability in patients with upper trapezius MPS [10].

Methods

This study employed a quasi-experimental design with a two-group pre-test–post-test approach to compare the effectiveness of the Muscle Energy Technique (MET) and Ischemic Compression (IC) in reducing pain among employees with upper trapezius myofascial pain syndrome (MPS). The study population consisted of 26 employees from the South Sulawesi Provincial Education Office who were diagnosed with upper trapezius MPS. A total sampling technique was used, whereby all eligible participants were recruited and equally allocated into two intervention groups (n = 13 per group). Group 1 received the Muscle Energy Technique, whereas Group 2 received Ischemic Compression. Pain intensity was assessed before and after the intervention to evaluate within-group changes and compare the effectiveness of the two treatment approaches. The intervention protocols for each group were implemented according to standardized clinical procedures described below:

Group 1 Muscle Energy Technique

a. Starting Position: The patient sits while the physiotherapist stands behind them. One of the physiotherapist's hands is placed on the lateral side of the patient's head, and the other hand is on the patient's shoulder.
b. Technique: The patient is instructed to resist the physiotherapist's hand, which is pushing the head towards depression, using an isometric contraction (10- 20%).
c. Post-Isometric contraction: The patient is asked to relax and control their breathing. Afterward, the patient is instructed to move their shoulder laterally while the physiotherapist's hand assists in pushing the shoulder into depression.

Group 2: Ischemic Compression

a. Starting Position: Ensure the patient is in a comfortable position, typically seated with the muscle to be treated in a stretched state. The therapist should explain the procedure and goals of the intervention to the patient to ensure they understand the process.
b. Trigger Point Identification: The therapist palpates the muscle to locate the trigger points, which are usually in the upper trapezius or other tense muscles.
c. Applying Pressure: The therapist uses their thumb or other fingers to apply direct pressure to the trigger point. This pressure should be applied gradually, starting at a low intensity and increasing slowly. The pressure is typically held for 30 to 60 seconds, depending on the patient's pain tolerance and response to the therapy.
d. Rest Period: After the pressure period, the therapist provides a rest period of about 10 seconds before repeating the application of pressure. This process can be repeated up to three times in one session. The outcomes of pain level assessment were carried out using a visual analog scale. The assessment was carried out at the first and last meetings, within a period of 3 weeks, then recorded and processed into SPSS.

The data obtained will be primary data measured using the visual analogue scale for each sample (pre-test and post-test data) from each group. This data will then be analysed using the SPSS

program. The data were analyzed using both descriptive and inferential statistics. Descriptive analysis was performed to summarize participants' demographic characteristics, including age and gender. The normality of the data was assessed using the Shapiro–Wilk test. For normally distributed data ($p > 0.05$), within-group differences between pre- and post-intervention pain scores were analyzed using paired-samples t-tests, while between-group differences in treatment effectiveness were evaluated using independent-samples t-tests. If the data had not met the assumption of normality ($p < 0.05$), equivalent non-parametric tests would have been employed, specifically the Wilcoxon signed-rank test for within-group comparisons and the Mann–Whitney *U* test for between-group comparisons.

Results

The study included 26 participants, equally allocated to the Muscle Energy Technique (MET) and Ischemic Compression (IC) groups (n = 13 each). The demographic characteristics were comparable between groups, with an identical gender distribution of 38.5% males and 61.5% females. Participants in the MET group were distributed across the following age categories: 24–29 years (n = 1), 30–35 years (n = 2), 36–41 years (n = 2), 42–47 years (n = 2), 48–53 years (n = 3), and 54–59 years (n = 3). Similarly, the IC group comprised participants aged 24–29 years (n = 1), 30–35 years (n = 2), 36–41 years (n = 1), 42–47 years (n = 1), 48–53 years (n = 3), and 54–59 years (n = 5). Both interventions resulted in reductions in pain severity following treatment. In the MET group, baseline pain consisted of nine participants with moderate pain and four with severe pain; following the intervention, 12 participants reported mild pain and only one reported moderate pain, indicating a marked improvement in pain status. Likewise, the IC group demonstrated pain reduction, with baseline findings of 11 participants experiencing moderate pain and two experiencing severe pain. After treatment, five participants reported mild pain and eight reported moderate pain, suggesting that although both interventions were effective in reducing pain, the MET group showed a greater shift toward mild pain compared with the IC group.

The Shapiro–Wilk test demonstrated that all pre- and post-intervention data were normally distributed in both the Muscle Energy Technique (MET) and Ischemic Compression (IC) groups (all $p > 0.05$), supporting the use of parametric statistical analyses. Within-group comparisons using paired-samples t-tests revealed significant reductions in pain following both interventions. Specifically, the MET group showed a statistically significant decrease in pain ($p < 0.001$), while the IC group also demonstrated a significant improvement ($p < 0.001$). Between-group analysis using an independent-samples t-test indicated a statistically significant difference in treatment effectiveness ($p < 0.001$). The mean pain reduction was greater in the MET group (mean reduction = 4.008) than in the IC group (mean reduction = 2.077), indicating that the Muscle Energy Technique was significantly more effective than Ischemic Compression in reducing pain among individuals with upper trapezius myofascial pain syndrome.

Table 5. 1 Distribution of Respondents Based on Gender Group

Gender	MET Group		IC Group	
	f	%	f	%
Male	5	38.5	5	38.5
Female	8	61.5	8	61.5

Table 5.2 Distribution of Respondents by Age Group

Age Group	MET Group		IC Group	
	f	%	f	%
24 – 29	1	7.7	1	7.7
30 – 35	2	15.4	2	15.4
36 – 41	2	15.4	1	7.7
42 – 47	2	15.4	1	7.7
48 – 53	3	23.1	3	23.1
54 – 59	3	23.1	5	38.1

Tabel 5.3 Pain Scale Distribution

Pain Scale	MET Group				IC Group			
	Pre-Test		Post-Test		Pre-Test		Post-Test	
	f	%	f	%	f	%	f	%
No Pain	0	0	0	0	0	0	0	0
MIld	0	0	12	92.3	0	0	5	38.5
Moderate	9	69.2	1	7.7	11	84.6	8	61.5
Severe	4	30.8	0	0	2	15.4	0	0

Table 5.4 Normality Test Analysis Results

Group Data	*Shapiro-Wilk Test*			
	MET Group		IC Group	
	Statistic	p	Statistic	p
Pre-Test	0.911	0.190	0.953	0.643
Post-Test	0.950	0.549	0.915	0.213

Table 5.5 Results of Paired Sample t Test Analysis in the MET Group

Measurement Time	n	Mean	SD	t	p
Pre-Test	13	6.938	0.5347	11.445	0.000
Post-Test	13	2.931	1.0812		

Table 5.6 Results of Paired Sample t Test Analysis in IC Group

Measurement Time	n	Mean	SD	t	p
Pre-Test	13	6.900	0.4708	10.172	0.000
Post-Test	13	4.823	0.8418		

Table 5. 7 Results of Independent Sample t Test Analysis

Group	n	Mean	SD	t	p
MET	13	4.008	1.2626	4.763	0.000
IC	13	2.077	0.7362		

Discussion

Pain perception can change with age, and there are differences in pain response between men and women. Generally, women tend to report pain complaints more often than men [11]. The average physical strength of women is about two-thirds of men's muscle strength, although in some aspects, women are more meticulous. Therefore, the division of work tasks should be

adjusted to the abilities and limitations of each gender [12]. This study supports the findings of Rahman [12], which states there is no significant relationship between gender and myofascial trigger point syndrome. However, based on the researcher's observations of 26 respondents, there was a tendency for men to experience MPS more often than women. This finding is not strong enough as a reference and requires further research with a larger sample size.

This study involved respondents aged 24–59, with a dominance of the 30+ age group. This suggests that most employees at the South Sulawesi Provincial Education Office are at an age susceptible to MPS. Ching Yap's research notes that the body's physiological functions, including muscle strength and stability, peak at age 30 and tend to decline thereafter. This decline is accelerated by degenerative processes, reduced body fluids, and the replacement of tissue with scar tissue in individuals over 40 [13]. These conditions make muscles prone to stiffness, especially when in a prolonged static position. This study's data reinforces that the 30+ age group experiences MPS more frequently than younger age groups.

The Visual Analog Scale (VAS) is a very easy and simple pain measurement scale. The measurement is carried out by visually grading the level of pain experienced by the patient. The method involves giving the patient a 10 cm straight line and asking them to mark an 'X' on the line, with the left end representing no complaints and the right end representing very severe pain [14]. In this study, the researcher used VAS to measure the pain level felt by respondents, based on the objectivity of the respondents in determining their pain level. The distribution of pain scale can be seen in Table 5.3, where the 26 samples were divided into two intervention groups: the MET and IC groups. The pain scale distribution was 69.2% for moderate pain and 30.8% for severe pain in the MET group, while the IC group had 84.6% moderate pain and 15.4% severe pain. MET works by activating target muscles, such as the upper trapezius, sternocleidomastoid, cervical flexor muscles, erector spinae, scapular retractors, suboccipital muscle group, pectoral muscles, and levator scapulae. This activation triggers the Golgi Tendon Organ (GTO), which plays a role in regulating muscle tone [15].

The study results show a significant level of influence, as seen in Tables 5.3 and 5.5, where the pain scale before and after the Muscle Energy Technique intervention showed a significant reduction, with a 90% effect in lowering pain from moderate and severe to mild. Based on the research findings, it can be concluded that the administration of Muscle Energy Technique is highly recommended for reducing pain intensity in patients with Myofascial Syndrome. The IC technique applies direct pressure to trigger points to reduce the accumulation of metabolic irritants. This pressure facilitates the release of these substances so they can be reabsorbed into the bloodstream, ultimately reducing the nerve sensitization that causes pain [1].

Based on the data processing results in Tables 5.3 and 5.6, it was found that the effect of Ischemic Compression on reducing pain intensity was only 40% when comparing before and after the intervention. Therefore, it can be concluded that the administration of Ischemic Compression did not have a significant effect. This is because the level of pain intensity reduction before and after the intervention with Ischemic Compression was only 40%. Thus, it can be concluded that Ischemic Compression does not cause a significant change in pain intensity in Myofascial Syndrome of the upper trapezius.

Both interventions were able to reduce pain, increase range of motion, and improve function in patients with MPS. However, MET showed a greater effect than IC. These results are consistent with the research of Gilani (2018) and Rahmawati [7], who stated that MET is not only effective in reducing pain but also superior in improving joint mobility and function compared to IC. Therefore, the results of this study recommend the use of MET as the primary choice for the treatment of upper trapezius MPS, while IC can be considered an alternative or supplementary therapy.

Limitations

This study has limitations that should be addressed in future research. The first limitation is that the researcher was unable to fully control the varied physical activities of the participants. The second limitation is the small sample size, which means the findings may not be representative of the entire population of employees with upper trapezius myofascial syndrome in the city of Makassar.

Conclusion

The findings of this study demonstrated that both interventions were effective in reducing pain in individuals with upper trapezius myofascial pain syndrome (MPS). The application of the Muscle Energy Technique (MET) resulted in a statistically significant reduction in pain intensity, while Ischemic Compression (IC) also produced significant pain relief. However, comparative analysis revealed that MET was significantly more effective than IC, as evidenced by the greater mean reduction in pain scores observed in the MET group. These findings suggest that although both treatment approaches are beneficial for managing upper trapezius MPS, the Muscle Energy Technique provides superior clinical outcomes in terms of pain reduction.

Author Contribution

NAR is responsible for the study design, data collection, data analysis, and drafting the initial manuscript.
SSL is responsible for the literature review, interpretation of results, and substantive revision of the manuscript.
AT provided critical input, project supervision, and final approval for publication.

Conflict of interest

The authors declare that there are no financial or personal conflicts of interest that could have influenced the results or interpretation of the findings in this manuscript. This research was funded entirely by the authors' personal.

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