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ORIGINAL ARTICLE

A COMPARISON OF EXTRACORPOREAL SHOCK WAVE THERAPY AND MUSCLE ENERGY TECHNIQUE ALONG WITH CRYOTHERAPY FOR STERNO CLEIDO MASTOID MUSCLE IN CERVICOGENIC HEADACHE

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ABSTRACT

Background: Cervicogenic headache (CGH) is a secondary headache arising from musculoskeletal dysfunction of the cervical spine, commonly involving the sterno-cleidomastoid muscle. These techniques aim to relieve pain, improve mobility, and restore function. Objective of the study was to compare the effect of Extracorporeal Shock Wave Therapy with Cryotherapy versus Muscle Energy Technique with Cryotherapy for the sterno-cleidomastoid muscle in patients with cervicogenic headache. **Methodology:** Study Design was quasi-experimental design, involving two groups as Group A and Group B with pre-test and post-test measurements. 30 subjects aged 20-40 years diagnosed with cervicogenic headache related to the SCM muscle were selected. Group A received ESWT along with Cryotherapy, whereas Group B received MET along with Cryotherapy. Outcome Measures: Neck Disability Index and cervical Range of Motion were measured on the first day (Week 1) and last day (Week 4) of the intervention. The pre-test and post-test scores were analyzed and presented in tabular and graphical form. **Results:** While both groups showed significant improvement in reducing pain and disability, Group A demonstrated greater improvement in cervical ROM and faster pain relief compared to Group B. Group B showed more consistent improvement in functional outcome scores over time. Statistical analysis showed significant differences between both groups ($p < 0.05$). **Conclusion:** The results indicated that Group A (ESWT with cryotherapy) had better improvement in ROM and faster symptom relief, whereas Group B (MET with cryotherapy) showed better improvement in long-term functional outcomes. The study concludes that both approaches are beneficial, but MET with Cryotherapy is more effective in long-term functional outcomes.

Keywords: Cervicogenic headache, Extracorporeal shock wave therapy, Muscle energy technique, Sternocleido mastoid muscle, Cryotherapy, Neck Disability Index, Cervical range of motion

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INTRODUCTION

A type of secondary headache known as cervicogenic headache (CGH) is brought on by musculoskeletal conditions affecting the cervical spine and soft tissues around it. Usually unilateral, it starts in the upper cervical segments and is characterised by soreness, limited neck movement, and pain that radiates to the head and face. The sternocleidomastoid (SCM), one of the most often affected muscles in CGH, is essential for cervical movement, head orientation, and posture (Fernández-de-Las-Peñas et al., 2018)¹.

The SCM's trigger points and mechanical strain play a major role in headache production, frequently imitating tension-type or migraine headaches. Usually, dysfunctions in the intervertebral discs, cervical zygapophyseal joints, or surrounding muscles cause cervicogenic headaches. Clinical symptoms include referred pain in the frontal and occipital areas, decreased cervical range of motion, and neck pain. Because the symptoms of this condition might overlap with those of other primary headaches, diagnosing it can be difficult, and treatment plans must be carefully customised (Jull et al., 2019)².

Targeting the biomechanical deficiencies causing the headache, manual therapy and physical modalities have been thoroughly investigated for CGH throughout the past ten years. In the field of musculoskeletal rehabilitation, extracorporeal shock wave therapy, or ESWT, has recently drawn interest. Target tissues are exposed to concentrated mechanical acoustic waves using this non-invasive therapy method. ESWT stimulates cellular regeneration, enhances local circulation, and interferes with pain transmission pathways (Zhao et al., 2022).³ ESWT has been shown in studies to be useful in

treating chronic musculoskeletal pain, especially diseases associated to the neck, and myofascial trigger points. By focussing on myofascial trigger points in the SCM and upper trapezius, Wang et al. (2021)⁴.

Demonstrated that ESWT decreased pain and enhanced cervical range of motion in patients with CGH.³ Muscle Energy Technique (MET), on the other hand, is a type of manual therapy that increases joint mobility and muscle length by first using voluntary muscle contraction against a counterforce, then stretching. It is very helpful in addressing cervical spine joint limitations and muscle imbalances. Research indicates that applying MET to the SCM improves cervical kinematics, eases muscular tension, and lessens the frequency and severity of cervicogenic headaches (Sahu et al., 2020).⁵ According to a study by Desai et al. (2017), throughout a 4-week intervention period, MET dramatically improved functional ratings and decreased the severity of headaches in CGH patients.

CGH is still a common and under diagnosed condition among those who lead sedentary lives, particularly those who spend a lot of time in a stationary position, such students, desk workers, and digital professionals. Cervical flexion overload, which is frequently caused by poor ergonomic practices, puts more strain on the SCM and other anterior cervical muscles⁶.

Trigger point development, reduced mobility, and pain radiation are all influenced by the cumulative effect (Karthikbabu et al., 2021). This emphasises the importance of early detection and treatment plans that target the condition's neurological and musculoskeletal components. Over the last ten years, a number of clinical trials have compared various CGH therapies. For acute pain, medication is still

the first line of treatment, but non-invasive physical treatments are becoming more popular for long-term care. Two popular options are ESWT and MET because of their efficacy, safety record, and low incidence of adverse effects⁷.

Hassan et al. (2023) discovered that while both ESWT and MET significantly improved the Visual Analogue Scale (VAS) and Neck Disability Index (NDI), ESWT reduced pain a little more quickly⁸. On the other hand, Rajeswari et al. (2019) discovered that MET had a longer-lasting impact on CGH recurrence rates over a period of six weeks. In cervical function, the SCM muscle acts as a mobiliser and stabiliser. Its neuronal interconnectedness and anatomical linkages explain its role in CGH.

Changes in proprioception, forward head posture, and cervicocranial pain referral patterns are caused by SCM dysfunction. Therefore, the dysfunction of this muscle must be directly addressed by any effective treatment intervention⁹.

While MET restores muscle balance and neuromuscular function, ESWT breaks down calcifications and improves vascularity in the SCM (Lee et al., 2022). Comparative research is necessary to identify the most successful method for CGH, as evidence for both therapies is emerging. This study compares the effects of muscular energy technique and extracorporeal shock wave therapy on the sternocleidomastoid muscle in cervicogenic headache patients. The objective is to ascertain which approach offers the most benefit in terms of decreased handicap, improved cervical range of motion, and pain reduction¹⁰.

Inclusion criteria: Age between 20 to 40 years, Both male and female participants included, Unilateral headache related by pain for more than 3 months, Pain and tenderness at the upper cervical segments, Symptoms (either left or right side), As well as pain and movement restriction in cervical region, especially in MTP in SCM and the upper cervical rotation.

Procedure:

- A total number of 30 subjects who met the inclusion criteria were recruited by convenient sampling method. After the informed consents were obtained, they were divided into 2 groups: Group A and Group B with 15 subjects in each group.
- Group A: Subjects received Extracorporeal Shock Wave Therapy (ESWT) with Cryotherapy.
- Group B: Subjects received Muscle Energy Technique (MET) with Cryotherapy.
- Treatment was given for 4 weeks with 5 sessions per week (total of 20 sessions).
- Each therapy session lasted for approximately 30 minutes.

Extracorporeal shockwave therapy:

- ESWT was delivered using a radial shockwave device with energy flux density (EFD) ranging from 0.10 to 0.25 mJ/mm².
- In this study, participants in the ESWT group received 1500 shocks per session with a frequency of 3.5 Hz using an Almagia DUO 2007 device (Zhou Medical Devices Trading Co., Ltd., California, USA).
- During the treatment, participants were asked to stop at any time if they felt pain or discomfort.

Muscle Energy Technique (MET):

- All MET techniques were performed in a supine position, aligning the subject’s neck toward the contralateral side in hold-relax techniques and toward the opposite side for reciprocal inhibition.
- An isometric force of 20%–30% of maximal voluntary contraction was applied. Each technique was repeated three times and the treatment was carried out for 30 minutes.

Specific MET Applications:

To correct upper cervical rotation ROM limitation:

- The therapist stood at the patient’s head and passively rotated the upper cervical region (C0–C1 to C4–C5) towards the barrier.
- The patient was asked to contract agonist muscles for 5–7 seconds.
- After relaxation, the head was rotated to the new barrier.

To correct upper cervical flexion ROM limitation:

- Therapist’s hand was placed below the occiput and the other under the chin.
- The patient was asked to contract deep cervical flexor muscles for 5–7 seconds.
- After relaxation, the head was flexed to a new barrier.

To correct upper cervical extension ROM limitation:

- Therapist’s hand was placed at the occiput and the other hand on the patient’s forehead.
- The patient was asked to contract upper cervical extensor muscles for 5–7 seconds.
- After relaxation, extension was increased towards the new barrier.

To correct upper cervical lateral bending ROM limitation:

- Therapist’s hand was placed at the occiput, and the patient was asked to contract lateral flexor muscles for 5–7 seconds.
- After relaxation, lateral bending was increased towards the new barrier.

Cryotherapy:

- Cryotherapy was used to treat tight or painful sternocleidomastoid (SCM) muscle by applying cold therapy directly to the affected area.
- This technique helps reduce inflammation, muscle spasms, and pain associated with tension headaches or trigger points in the SCM.
- Treatment was given for 4 weeks (5 sessions/week for 10 minutes per session)

RESULTS

Table 1: Descriptive Statistics For Range Of Motion – GROUP A AND GROUP B.

GROUP	ROM	MEAN	STANDARD DEVIATION	PAIRED ‘t’ VALE
GROUP A	PRE TEST	45.07	1.34	22.14
	POST TEST	53.93		
GROUP B	PRE TEST	44	1.63	29.55
	POST TEST	58.93		

Descriptive statistics for range of motion scale in Group A shows that paired 't' test values of pre Vs post test values of Group A was 22.14 at 0.05% level which greater than tabulated 't' values 2.15. Group B shows that paired 't' value of pretest Vs posttest values of Group B was 29.55 at 0.05 % level which was greater

than tabulated 't' values 2.15 This showed like there significant difference between pre Vs post test results of Group A and Group B for ROM .This exposed that there was significant improvement in post test mean values response to ROM in Group A and Group B.

Table 2: Range Of Motion (Post Test Analysis)

ROM	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	UNPAIRED 't' VAUE
GROUP A	53.93	5.00	1.63	9.14
GROUP B	58.93			

The unpaired t-value of 9.14 exceeded the critical t-value of 2.048, indicating a statistically significant difference at the 0.05 level between the mean differences of Group A and Group B. The pre-to-post-test mean change in Group A was 53.93, while in Group B, it was 58.93

resulting in a mean difference of 5.00 between the two groups. These findings suggest a greater reduction in neck pain and improvement in strength in Group B compared to Group A following the intervention.

Table 3: Descriptive Statistics for Neck Disability Index Scale – Group A and Group B.

GROUP	NDI	MEAN	STANDARD DEVIATION	PAIRED 't' VAUE
GROUP A	PRE TEST	38.53	1.78	17.45
	POST TEST	30.20		
GROUP B	PRE TEST	39.60	1.84	25.66
	POST TEST	27.53		

Descriptive statistics for neck disability index scale in Group A shows that paired 't' test values of pre Vs post test values of Group A was 17.45 at 0.05% level which greater than

tabulated 't' values 2.15. Group B shows that paired 't' value of pretest Vs posttest values of Group B was 25.66 at 0.05 % level which was greater than tabulated 't' values 2.15 This

showed like there significant difference between pre Vs post test results of Group A and Group B for NDI .This exposed that there

was significant improvement in post test mean values response to NDI in Group A and Group B.

Table 4: Neck Disability Index Scale (Post Test Analysis)

NDI	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	UNPAIRED 'T' VALUE
GROUP A	30.20	2.67	1.84	4.36
GROUP B	27.53			

The unpaired t-value of 4.36 exceeded the critical t-value of 2.048, indicating a statistically significant difference at the 0.05 level between the mean differences of Group A and Group B. The pre-to-post-test mean change in Group A was 30.20, while in Group B, it was 27.53, resulting in a mean difference of 2.67 between the two groups. These findings suggest a greater reduction in neck pain in Group B compared to Group A following the intervention.

DISCUSSION

The aim of this study was to compare the effectiveness of Extracorporeal Shock Wave Therapy (ESWT) versus Muscle Energy Technique (MET) along with cryotherapy on reducing pain and improving cervical range of motion in patients with cervicogenic headache (CGH) associated with sterno-cleidomastoid (SCM) dysfunction. A total of 30 subjects were selected using a convenient sampling method after considering the inclusion and exclusion criteria. Pre-test data were collected for Group A (ESWT + cryotherapy) and Group B (MET + cryotherapy), and participants underwent treatment for 4 weeks, with 5 sessions per week. The Goniometer and Neck Disability Index (NDI) were used as the primary parameters. The paired 't' test was used to compare the pre- and post-test results within

each group, and the unpaired 't' test was used to compare the mean differences between Group A and Group B.

In the analysis and interpretation of range of motion between groups A and B. The pre versus post test mean of group A was 53.93 and the pre versus post mean of group B was 58.93 and the mean difference of group A and group B was 5.00. The unpaired 't' value of 9.14 was greater than the tabulated 't' value of 2.15, which showed that there was a statistically significant difference at 0.05 level, between the mean difference of group A and group B. which showed that there was significant improvement in function in group B compared to group A in response to intervention.

In the analysis and interpretation of Neck Disability Index score between groups A and B. The pre versus post test mean of group A was 30.20 and the pre versus post mean of group B was 27.53 and the mean difference of group A and group B was 2.67. The unpaired 't' value of 4.36 was greater than the tabulated 't' value of 2.15, which showed that there was a statistically significant difference at 0.05 level, between the mean difference of group A and group B. which showed that there was significant reduction in pain and improvement in function in group B compared to group A in response to intervention .

ESWT significantly reduces pain and muscle tension in patients with myofascial pain syndrome, including the SCM, supporting the current study's rationale for using ESWT. Their study concluded that radial shock waves improve trigger point sensitivity and local circulation, leading to pain relief¹¹. Cryotherapy was shown to significantly reduce cervical muscle spasm and headache intensity in tension-type headache patients. The application of cryotherapy over the SCM in this study aligns with those findings, confirming its role in alleviating localized muscular pain¹².

It emphasized that Muscle Energy Technique is an effective and safe manual therapy for increasing cervical mobility and decreasing pain in cervicogenic headache patients. This supports our findings where MET combined with cryotherapy improved neck flexibility and reduced headache frequency¹³.

Its Demonstrated that combining MET with cryotherapy provided significant pain relief and functional recovery in patients with upper cervical dysfunction. The synergistic effect of the manual technique with cryotherapy enhances neuromuscular inhibition and muscle relaxation. Found that MET significantly improved craniovertebral angle and reduced headache disability index scores in patients with postural and cervicogenic headaches, further validating the effectiveness of MET as used in the current study¹⁴.

ESWT delivers mechanical acoustic waves that stimulate tissue regeneration, disrupt pain transmission, and break down myofascial adhesions. When combined with cryotherapy, inflammation is reduced, and pain thresholds improve, offering early pain control and functional support during CGH rehabilitation. MET uses controlled isometric contractions

followed by passive stretching, which lengthens tight SCM muscles, restores mobility, and normalizes muscle tone. When combined with cryotherapy, it promotes muscle relaxation and reduces trigger point sensitivity, enhancing ROM and reducing disability¹⁵.

CONCLUSION

Both Extracorporeal Shock Wave Therapy and Muscle Energy Technique, when used along with cryotherapy, are effective in managing cervicogenic headache associated with sternocleidomastoid dysfunction. ESWT with cryotherapy appears to be more effective in reducing pain intensity and reducing disability. MET with cryotherapy shows better results in improving cervical range of motion. Based on the study findings, a combination of both approaches may be considered in clinical practice for a more holistic management of CGH.

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