CASE REPORT

Combined efficacy of instrument-assisted soft tissue mobilization and muscle energy technique in cervical myofascial pain: A case report

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ABSTRACT

Myofascial pain syndrome (MPS) is one of the most evident musculoskeletal disorders encountered among students involved in higher education. Risk factors such as poor or abnormal posture and overuse activities can predispose to developing MPS. The present study aimed to find the efficacy of instrument-assisted soft tissue mobilization along with muscle energy technique on cervical myofascial pain in university students. Pre and post-intervention assessments were done for pain, tenderness, range of motion in the cervical region, and high-sensitivity c-reactive protein (hsCRP). The patient received an instrument-assisted soft tissue mobilization (IASTM) and muscle energy technique (MET) thrice a week for a month. Pain intensity and tenderness decreased notably; the C-spine range of motion increased after 4 weeks of treatment with IASTM and MET, and hs-CRP also lowered. Applying IASTM combined with MET can decrease pain intensity and improve the C-spine range of motion in a patient with myofascial pain, though a study in a large sample is needed.

Keywords: Cervical myofascial pain, Instrument-assisted soft tissue mobilization, Muscle energy technique.

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INTRODUCTION

Cervical pain is a common musculoskeletal issue among undergraduate students and persists beyond graduation.[1,2] It is characterized by persistent, non-transient, or variable pain. Studies found that myofascial pain syndrome (MPS) is a common source of pain in subjects presenting chronic non-specific cervical pain.[3] MPS is characterized by a regional pain sensation with myofascial trigger points (MTrPs) with palpable taut bands of affected skeletal muscle and can cause distant motor and autonomic effects.[4] It was suggested that repeated small injuries in one muscle area could start a chain of events. This began with prolonged contraction of muscle fibers near an abnormal motor endplate, leading to an "energy crisis." This crisis caused long-lasting muscle fiber contraction and increased release of ACh, raising energy needs and pressing on capillaries, affecting blood flow. Trigger points (TrPs) could form due to low ATP and reduced blood supply, which hindered muscle relaxation.[5] The MTrP area is painful on compression and can present with a characteristic referred pain pattern, motor dysfunction, and autonomic phenomena.[4] Travell and Simons categorized MTrP as either active or latent. Active MTrPs cause consistent pain in the skeletal muscle, whereas latent MTrPs are clinically silent and cause pain only when compressed.[5] Active and latent MTrPs may cause a restricted range of motion and weakness of the muscles harboring the MTrPs.[4] The study aimed to find the combined efficacy of Instrument Assisted Soft Tissue Mobilization and Muscle Energy Technique in reducing myofascial cervical pain and improving range of motion.

CASE REPORT

A 20-year-old female physiotherapy student visited the physiotherapy clinic of Brainware University, Kolkata, with the chief complaint of cervical pain for 20 days. The pain was continuous, non-radiating, and deep aching in character with an insidious onset. The pain aggravates when she keeps the neck flexed for a prolonged period. She is somewhat relieved by applying heat and keeping a rolled cloth under the neck in a lying position. The numerical pain rating scale score (NPRS) was 7/10 (0 = no pain; 10 = worst pain ever) on the first day of assessment, as reported by the patient. She recalled no past or recent traumatic incident in the neck region. The patient revealed that currently, for study purposes and online classes, she uses her mobile phone (average 10–12 hours/day), and for this, she had to keep the neck in a flexed position for an extended period. On observation, the patient had a forward head posture (FHP) and a protracted scapula, and the left shoulder was more elevated than the right shoulder (Figure 1). The patient had a reduced range of motion (ROM) in the cervical region (Table 1), measured using a universal goniometer. Hutchison's clinical methods were used to assess the tenderness. On palpation, G3 tenderness in the spinous process of C3, C4, C5, and C6 vertebra was

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Figure 1: Posture assessed in lateral (1a), anterior (1b), and posterior view (1c): Forward head with the protracted scapula, left shoulder slightly elevated

Table 1: Pre-treatment range of motion of the patient. Both active and passive range of motion was assessed using a universal goniometer on Day 1 of the treatment

Cervical range of motion				
Range of motion	*Left: Active range of motion*		*Right: Passive range of motion*	
	PreT	*PostT*	*PreT*	*PostT*
Rotation (70°–90°)	60°	75°	45°	70°
Lateral flexion (20°–45°)	18°	30°	10°	25°
	PreT		PostT	
Flexion (80°–90°)	70° (Painful)		85°	
Extension (70°)	45° (Painful)		70°	

PreT = Pre-treatment (Day 1 of the treatment); PostT = Post-treatment (Day 30 of the treatment).

noted (G0 = no tenderness; G1 = the patient says that the area is tender; G2 = patient winces due to pain; G3 = patient winces and withdraws the affected part; G4 = patient doesn't allow touching the affected part). Multiple taut bands and myofascial trigger points (Mtrps) within the taut bands were found in the bilateral upper trapezius (Rt>Lt) and the deep cervical extensor muscles (suboccipital muscles). On Day 1 of the treatment, high-sensitivity C-reactive protein (hs-CRP) was 1.90 mg/l (measured immunoturbidimetrically). C-spine X-ray on A-P and lateral view showed reduced cervical lordosis. The patient was diagnosed with myofascial pain syndrome in the cervical region with multiple active trigger points.

Physiotherapy Intervention

Treatment

The following physiotherapy interventions and exercises were used for three consecutive days/week for a month:

IASTM Protocol

IASTM was applied over the myofascial trigger points of the targeted muscles (upper trapezius, suboccipital muscles) at 30° to 60° for 5 minutes in a multidirectional stroking fashion. The treatment was given in 3 sessions/week for a month. IASTM promotes collagen repair and regeneration due to fibroblast recruitment, and it also drives connective tissue remodeling by resorbing excessive fibrosis. This leads to the relaxation and disintegration of fascial limitations, adhesions, and scar tissues. Warming up the tissues using a hot pack for 10 minutes before application of IASTM was recommended to increase the blood supply and make the tissues more pliable. After the application of IASTM, ice was applied for 10 minutes to control side effects such as petechiae and muscle soreness.[6]

MET protocol

To restore range of motion, relax hypertonic musculature, and normalize muscular length in the upper trapezius muscles, the muscle energy approach was applied. To extend the upper trapezius muscle fibers during the MET, the participant was asked to lie down in a supine position with the cervical spine in a contralateral flexion to the region of the body being treated. The upper trapezius muscles were contracted at a moderate intensity for 5 seconds, and then they were allowed to rest for 3 seconds as they approached the next barrier. In every session, this technique was carried out four times. The individual was requested to move the neck into flexion, stopping just short of the cranioflexion barrier for the suboccipitalis. The neck was then positioned inside a new barrier. The participant was given instructions on how to perform isometric neck exercises in a neutral sitting posture three times a day at home. The exercises included circling the shoulders circle and counterclockwise, retraction of the scapula with chin tuck, flexion, extension, lateral bending/flexion on each side, and left and right neck rotation. Each exercise consisted of sets of ten repetitions of the maximal voluntary contraction, with progressive hold times of 3, 5, 7, and 10 seconds, depending on the participant's pain threshold and level of tolerance. The patient was advised to maintain good posture by retracting their head and scapula.

RESULTS

The patient was assessed every 15th day of the treatment. The treatment session was given for three consecutive days of the week for a month, from November to December 2022 (except Sunday).

Table 1 depicts the increase in the range of motion after the completion of the treatment session.

Table 2 represents the NPRS and tenderness scores from day 1 to 30 of the treatment. The NPRS assesses the pain intensity, where 0 represents 'no pain' and 10 represents 'severe pain.' The NPRS scoring was reduced from 7/10, recorded on the first day of treatment, to 0/10, recorded on the last day of the treatment session. On day 1 of the treatment, tenderness was

Table 2: Changes in NPRS and tenderness during the treatment

Treatment days	*Day 1*	*Day 15*	*Day 30*
NPRS (0–10)	7	5	0
Tenderness (G0–G4)	G3	G1	G0

recorded as G3, while the tenderness assessed on day 30 of the treatment was G0. The serum hs-CRP was measured on the 20th day of the treatment. The hs-CRP decreased from 1.9 to 0.98 mg/l. The normal range of serum hsCRP is <1-mg/l. The pain intensity of the MTrPs within the palpable taut bands was considerably decreased, and the taut bands were diminished in the targeted muscles.

DISCUSSION

Cervical pain is one of the very common complaints reported by almost every person worldwide in their life. Cervical pain may be linked with referred pain along myotomal patterns to the anterior chest, arm, and dorsal spine areas in subjects with normal neurological evaluation and no signs of nerve root irritation or compression.[7] The present study investigated the combined effectiveness of instrument-assisted soft tissue mobilization and muscle energy techniques in reducing cervical myofascial pain. In our case report, the patient's main concerns were pain in the cervical region and decreased cervical range of motion. The patient demonstrated a decrease in the intensity of pain after 4 weeks of supervised physiotherapy management. The pain intensity decreased from 7 (NPRS) to 0 (NPRS), which shows a meaningful clinical change.[8]

Long-term neck flexion is associated with pains in the neck, shoulders, and upper extremities. This is because prolonged neck flexion causes static muscular strain, exacerbated by the absence of arm support and repetitive finger movements, especially when using just one hand.[9] The cervical region could experience higher muscular loads and increased stress if head flexion is increased.[10] According to the study, the duration of mobile phone use is critical in determining the duration of neck. The duration of mobile phone use was positively related to the severity of neck pain.[9] It has been found that repetitive mobile use is associated with forward head posture, which may cause tightness in the posterior region muscles.[11]

This study found that combining IASTM and MET with proper postural correction reduces cervical pain. The frequency of headaches improved greatly during the treatment period. A progressive decrease in pain and tenderness was observed in each assessment period. IASTM therapy aims to repair connective tissues by removing excess fibrosis, which leads to collagen formation through the recruitment of fibroblasts. Scar tissue, adhesions, and fascial limitations are released and broken down by this, as described by Mostafa *et al*. in 202.[12] MET is a manual therapy technique that enhances the range of motion of any joint and is effective in treating muscle contracture or weakness by stimulating rhythmic muscle movements.[11] MET causes the sympathetic tone to be reduced through fascial stimulation and localized vasodilation. It is an effective method for improving the range of motion and treating neck pain in acute and chronic conditions.[11] In a randomized controlled trial, Mahmood *et al*. found that IASTM with stretching exercises was more effective in managing neck pain in upper crossed syndrome than routine physiotherapy.[12] Basu *et al*., in a study, compared the effects of IASTM and ischaemic compression in trapezius trigger points in badminton players.[13] The results of the study found a greater effect of IASTM than ischaemic compression in relieving trapezius trigger points.[13] In a systematic review, Lambert *et al*. found that IASTM may increase blood flow, decrease tissue viscosity, myofascial release, block pain receptors, and improve the flexibility of underlying tissue.[14] The systematic review suggested that IASTM can effectively decrease pain and improve function in various musculoskeletal conditions.[14] Thomas *et al*., in a systematic review, found the muscle energy technique to be an effective treatment technique in improving pain and range of motion in patients with chronic neck pain and other acute and chronic pain conditions.[15] In a non-randomized trial, Mahmood *et al*. compared IASTM and myofascial release for improving pain and mobility in chronic lumbar pain patients.[16] The findings of the study suggested IASTM to be superior to the myofascial release technique in decreasing pain and improving mobility in chronic lumbar pain.[16] Gilani *et al*. compared the effectiveness of muscle energy technique and ischaemic compression in upper trapezius myofascial trigger points[17] and found that muscle energy technique was more effective in reducing myofascial pain as well as in improving range of motion.[17]

The hs-CRP is known to be a sensitive biomarker of low-grade inflammation,[18] and studies have shown that serum hs-CRP was associated with greater pain intensity in patients with MPS.[19] A remarkable reduction was noted in the serum hs-CRP value of the patient at the end of the treatment session, and there was also a marked reduction in pain intensity and tenderness, which was further supported by a study by Shakouri *et al*. in 2020.[19] Abdulaziz *et al*. found a positive correlation between hs-CRP and pain intensity.[20] It was evident that after treatment with dry cupping therapy, hs-CRP level, as well as pain intensity, was reduced significantly in patients with chronic pelvic pain.[20]

Lack of long-term follow-up could be a limitation of this study, and this treatment protocol was considered short-medium term. Further research in large samples is necessary to assess the combined effectiveness of IASTM and MET treatment in patients with cervical myofascial pain, the effect of cervical myofascial pain on hs-CRP, and the efficacy of IASTM and MET treatment on hs-CRP.

Combining IASTM with MET effectively reduces pain intensity, tenderness, and hs-CRP levels while improving cervical ROM in cervical myofascial pain patients. This case report shows the potential for routine clinical integration of these

techniques, highlighting the need for large-scale studies to confirm their efficacy. Future research should explore long-term outcomes, optimal treatment frequencies, and cost-effectiveness. Integrating these techniques into preventive care for high-risk groups, such as students and office workers, could reduce chronic musculoskeletal disorder burdens.

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PEER-REVIEWED CERTIFICATION

During the review of this manuscript, a double-blind peer-review policy has been followed. The author(s) of this manuscript received review comments from a minimum of two peer-reviewers. Author(s) submitted revised manuscript as per the comments of the assigned reviewers. On the basis of revision(s) done by the author(s) and compliance to the Reviewers' comments on the manuscript, Editor(s) has approved the revised manuscript for final publication.