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Original Research Article

Immediate Effect of Myofascial Release Along with Muscle Energy Technique on Range of Motion and Pain in Patients with Shoulder Impingement Syndrome - An Experimental Study

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ABSTRACT

Aim: The aim of our study was to investigate the effectiveness of a single session of Myofascial release technique (MFR) along with Muscle Energy Technique (MET) on Range of Motion (ROM) and pain in patients with shoulder impingement syndrome.
Background: "Shoulder Impingement Syndrome (SIS) is a generic term for injuries to structures in the sub-acromial space, often attributed to anatomical abnormalities involving the coracoacromial arch or humeral head. The term 'impingement syndrome' describes a cluster of signs and symptoms, typically including pain during overhead reaching, discomfort in the midrange of arm elevation, and positive provocation tests. Impingement is classified into two groups: intrinsic and extrinsic, with extrinsic further classified as primary, secondary, and internal."
Methodology: An experimental study was conducted which included 30 subjects with shoulder impingement. The subjects were divided into experimental who received MFR along with muscle energy technique &control group who received conventional physiotherapy using lottery method. The pre-post evaluation of pain using VAS, Range of motion was conducted. After that statistical analysis was conducted for intra & inter group comparison using paired & unpaired test respectively
Results: The results indicated that myofascial release technique along with the muscle energy technique was more effective in improving range of motion in experimental group as compared to control group ($P < 0.05$).
Conclusion: This study concluded that a single session of myofascial release technique along with muscle energy technique showed immediate improvement in the glenohumeral abduction and external rotation ROM.

Keywords: *Muscle energy technique, Myofascial release, Range of motion, Shoulder impingement syndrome.*

INTRODUCTION

Shoulder pain constitutes a prevalent reason for visits to primary care and orthopaedic clinics worldwide. The prevalence of shoulder complaints is estimated to range from 7% to 34%, with shoulder impingement syndrome identified as a prominent underlying aetiology. Since its initial description in 1852, shoulder impingement syndrome has emerged as the foremost cause of shoulder pain, accounting for a substantial percentage, ranging from 44% to 65%, of all reported shoulder complaints. [1] Recent studies, such as the

cross-sectional investigation conducted by Sudhir Singh et al in a tertiary care hospital in North India, have reported a prevalence of subacromial impingement at 13.8%. [2]
Understanding the multifaceted nature of impingement syndrome is crucial, as it encompasses both intrinsic and extrinsic factors. Intrinsic impingement predominantly manifests as rotator cuff diseases, most commonly observed in individuals aged over 40. Conversely, extrinsic impingement arises from mechanical compression of tissues, specifically the rotator cuff, against the anterior inferior section of the acromion within the subacromial space. [3]
This syndrome can be further compounded by conditions like tendinitis, bursitis, and other musculotendinous impairments. Additionally, postural anomalies and muscle imbalances play a pivotal role in its development and progression. These encompass factors such as thoracic kyphosis, forward head posture, scapular protraction, and imbalances within specific muscle groups. Dr Janda's theory posits that subacromial impingement arises from a distinctive pattern of muscle imbalance, encompassing both weakness and tightness within various muscle groups. [4]
Moreover, emerging research has established a link between the presence of active myofascial trigger points in shoulder muscles and shoulder impingement syndrome. [5] These trigger points, characterized as hyperirritable areas within taut muscle bands, contribute to a deep, aching pain. [3] Given the broad demographic affected by shoulder impingement syndrome, with incidence increasing in tandem with age, the exploration of optimal treatment approaches becomes imperative.
While a systematic review has compared surgical and conservative treatments, suggesting that surgical interventions may not offer a substantial advantage in pain reduction over impingement-directed physical therapy, [1] a notable research gap pertains to the immediate effects of combining myofascial release with muscle energy technique on range of motion and pain in these patients. This represents a critical aspect of treatment efficacy that has remained relatively unexplored, holding potential for enhancing the quality of life for individuals grappling with shoulder impingement syndrome.

MATERIALS & METHODS

MATERIALS

Pen, Paper, Goniometer, Visual Analogue Scale, Informed consent form.

METHODOLOGY

- Study Design – An Experimental Study
- Sampling Method – Convenient sampling method
- Study population – Patients with shoulder impingement syndrome.
- Sample size- 30
- Study setting – Tertiary care hospital.
- Duration of study – 6 months.

Inclusion criteria

1. Age between 20-50yrs.
2. Visual analogue scale ≥ 3
3. Painful arc during shoulder flexion and abduction.
4. Positive Neer impingement test.
5. No use of analgesic and anti-inflammatory drugs and muscle relaxant with 24 hours before the Participation in the study

Exclusion criteria

1. Patients with history of surgery, fracture or dislocation
2. Traumatic onset.
3. Massive rotator cuff tears.
4. Rheumatoid arthritis.
5. Shoulder instability
6. Cervical radiculopathy.

Outcome measures:

1. Goniomenter (ICC = 0.52 to 0.97) [6]
2. Visual analogue scale (ICC = 0.97) [7]

PROCEDURE

The study commenced with the acquisition of necessary permissions from the

Institutional Ethics Committee of Dr. Ulhas Patil College of physiotherapy, Jalgaon. Participants were selected through convenient sampling, adhering to predetermined inclusion and exclusion criteria. Prior to any procedures, a comprehensive explanation of the study protocol was provided to each subject, and informed consent was obtained. Demographic data were meticulously collected from the 30 participants exhibiting painful and limited glenohumeral range of motion. These participants were then allocated into two groups using simple random sampling by lottery method, with 16 in the experimental group and 14 in the control group. Pre-assessments for range of motion and pain were conducted using a goniometer and visual analogue scale, respectively. The experimental group received a treatment regimen comprising myofascial release technique with muscle energy techniques, while the control group underwent conventional physiotherapy treatment involving stretching with ultrasound. Both groups underwent their respective interventions in a single session. Subsequently, post-treatment assessments were conducted to gauge pain levels utilizing the visual analogue scale (VAS) and measure glenohumeral range of motion using a goniometer. Following the interventions, demographic information and assessment scores were comprehensively analysed. The findings were then interpreted, allowing for the derivation of meaningful conclusions.

Intervention:
Experimental group underwent MFR along with MET for pectoralis major, pectoralis minor, subscapularis, levator scapulae.

Myofascial Release Technique: -
Pectoralis major - In the supine position, participants' pectoralis major muscle was palpated to identify restrictions and trigger points. The therapist moved their treatment arm passively into flexion while gliding over the muscle. Myofascial release technique (MFR) was performed on the pectoralis major muscle for about 3 to 5 minutes, taking the affected arm through various directions.

Pectoralis minor: - In the supine position, the treatment arm was positioned at 90 degrees of GH abduction and 90 degrees of elbow flexion. Despite the challenge of palpating the pectoralis minor muscle beneath the pectoralis major, the therapist applied sustained pressure on its trigger points while passively horizontally adducting and abducting the shoulder. MFR was performed on the pectoralis minor muscle for about 3 to 5 minutes.

Figure 1: MFR Pectoralis major

Figure 2: MFR for Pectoralis Minor

Subscapularis: - Participants had their humerus abducted to 45 degrees with the elbow flexed to 90 degrees. The humerus was externally rotated up to the available range of motion. The therapist palpated the subscapularis in the axilla to identify restrictions, taut bands, and trigger points. The identified restrictions were treated with myofascial release technique using sustained manual pressure on the subscapularis trigger points. MFR was given to the subscapularis for approximately 3 to 5 minutes.

Figure 3: MFR for Subscapularis muscle

Figure 4: MFR for Levator Scapulae

Levator scapulae: - Participants were positioned in the supine lying position. The therapist passively rotated the neck towards the opposite side and flexed it. The levator scapulae muscle was palpated to identify restrictions, taut bands, and trigger points. The identified restrictions were treated with myofascial release techniques (MFR) using sustained manual pressure on the levator scapulae trigger points. MFR was given to the levator scapulae for approximately 3 to 5 minutes.

Muscle Energy Technique: -

Pectoralis Major: - Participants receiving muscle energy technique were positioned supine along the edge of the examination table, allowing the humeral head to have no support in a posterior direction while the table provided scapular stabilization. The therapist passively horizontally abducted the shoulder until the first barrier. Then, the participants were instructed to push their test arm upwards with 20 to 25% of their maximal effort while the therapist applied manual resistance near the elbow joint, creating a 10-second isometric contraction. The therapist then further abducted and horizontally extended the participants' arm. This process was repeated three to four times, and the final stretch was held for approximately 20 to 30 seconds.

Figure 5: MET for Pectoralis Major

Figure 6 : MET for Pectoralis minor

Pectoralis Minor: - Participants were positioned in a side-lying position. The therapist passively retracted the shoulder until the first barrier. Then, participants were instructed to push their test arm towards the therapist (protracts) with 25% of their maximal effort, while the therapist applied manual resistance to the head of the humerus, creating a 10-second isometric contraction. The therapist then brought the participants' arm into retraction. This process was repeated three to four times, and the final stretch was held for approximately 20 to 30 seconds.

Subscapularis: - Participants receiving MET were positioned with the humerus abducted to 45 degrees and the elbow flexed to 90 degrees. The therapist passively externally rotated the shoulder until the first barrier. Then, participants were instructed to push their test arm towards the inside (internal rotation) with 25% of their maximal effort, while the therapist applied manual resistance distal to the elbow joint, creating a 10-second isometric contraction. The therapist then brought the participants' arm into external rotation. This process was repeated three to four times, and the final stretch was held for approximately 20 to 30 seconds.

Figure 7: MET for Subscapularis

Figure 8: MET for Levator scapulae

Levator scapulae: - Participants who received MET were positioned in the supine lying position. They were instructed to push their head towards the treatment table with 25% of their maximal effort, while the therapist applied manual resistance to create a 10-second isometric contraction. The therapist then brought the participants' head into cervical flexion. This process was repeated three to four times, and the final stretch was held for approximately 20 to 30 seconds.

Intervention for control group: -
The control group underwent conventional physiotherapy involving stretching with ultrasound.

Stretching: –
Shoulder adductors: - The participants who received stretching lay down with their elbows flexed to 90 degrees. The therapist held their lower arm and stabilized it with the other hand. The therapist then moved the participants' treated arm to fully abduct the shoulder, stretching the shoulder adductors.

Figure 9: Stretching for adductors

Figure 10: Streching for internal rotators

Shoulder internal rotators stretching – The participants received stretching and were positioned with the humerus abducted to 45 degrees and the elbow flexed to 90 degrees. The scapula was stabilized by the examination table. The therapist held the participants' volar surface of the forearm with one hand and passively rotated their shoulder externally.

Ultrasound: -

Participants received Ultrasound for 6 min for glenohumeral joint and were positioned in sitting with arm residing on thighs.

Figure 11: Ultrasound for Gleno-humeral Joint

DATA ANALYSIS

Data analysis was done using the Statistical Package for Social Sciences (SPSS version 21). Basic Descriptions were presented in the form of mean and Standard deviation. The data were assessed for normality using the Shapiro-Wilk test. Paired Sample 't' test was used to analyse the pre and Post differences for abduction and external rotation ROM. Pre and post VAS scores were compared Using Wilcoxon ranks signed test. Independent sample 't' test was used to know the difference

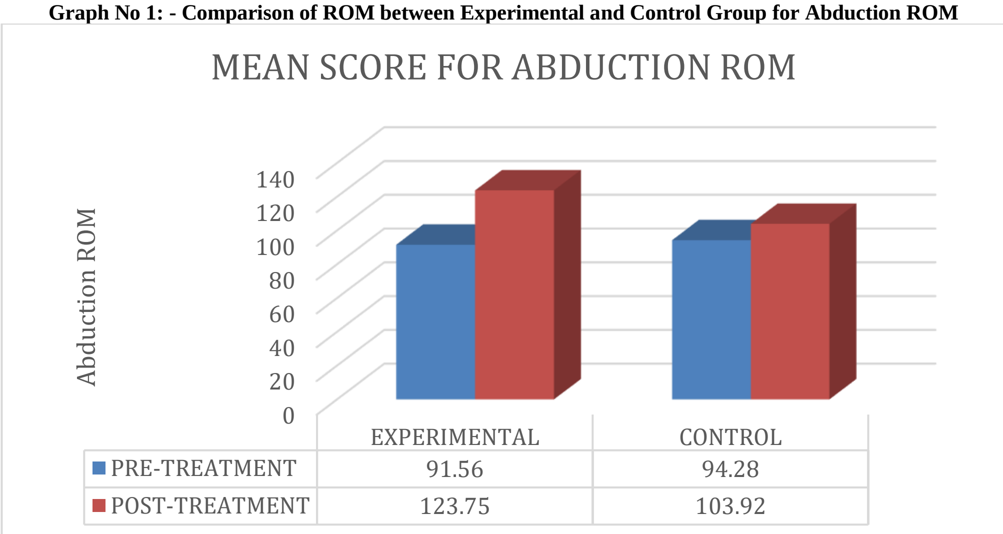
Between experimental and study groups for abduction and external rotation ROM. VAS scores between groups were compared with Mann whitney U test. The level of significance was set at $p < 0.05$ for all tests.

There was a significant difference between the experimental and control groups in range of motion, specifically abduction and external rotation, with $p < 0.05$. However, there was no Significant difference in the visual analogue scale scores between the control and experimental groups, with $p > 0.05$. The results indicated that myofascial release technique along with the muscle Energy technique was more effective in improving range of motion.

Table No 1: - Comparison of ROM between Experimental and Control Group for Abduction ROM

Abduction ROM		Mean ± Sd	Mean Difference	t value	p value
Pre-Treatment	Experimental	91.56 ± 11.36	2.72	0.75	0.45
	Control	94.28 ± 7.80			
Post-Treatment	Experimental	123.75 ± 9.57	19.82	5.93	<0.001
	Control	103.92 ± 8.58			

Graph No 1: - Comparison of ROM between Experimental and Control Group for Abduction ROM

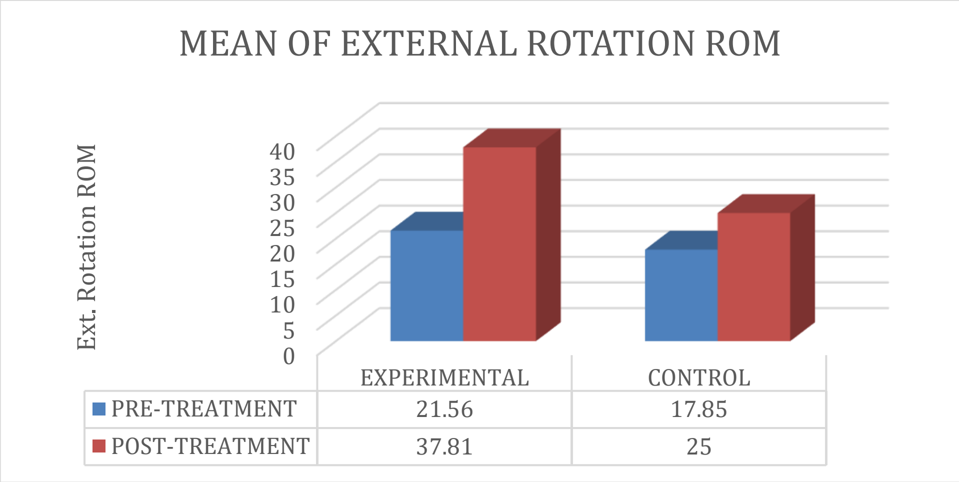


COMMENT: - Graph 1 Experimental Group Abduction - Significant increase from pre (91.56) to post (123.75) Control Group- Abduction - Significant increase from pre (94.28) to post (103.92). Table 1 showed Pre-Abduction- No significant difference (p = 0.457). Post Abduction- Experimental group showed significant increase (p < 0.001).

Table No 2: - Comparison of ROM between Experimental and Control Group for External Range ROM

External Rotation Rom		Mean ± Sd	Mean Difference	t value	p value
Pre-Treatment	Experimental	21.56 ± 9.25	3.705	1.15	0.26
	Control	17.85 ± 8.25			
Post-Treatment	Experimental	37.81 ± 12.77	12.81	3.06	0.005
	Control	25 ± 9.60			

Graph No 2: - Comparison of ROM between Experimental and Control Group for External ROM

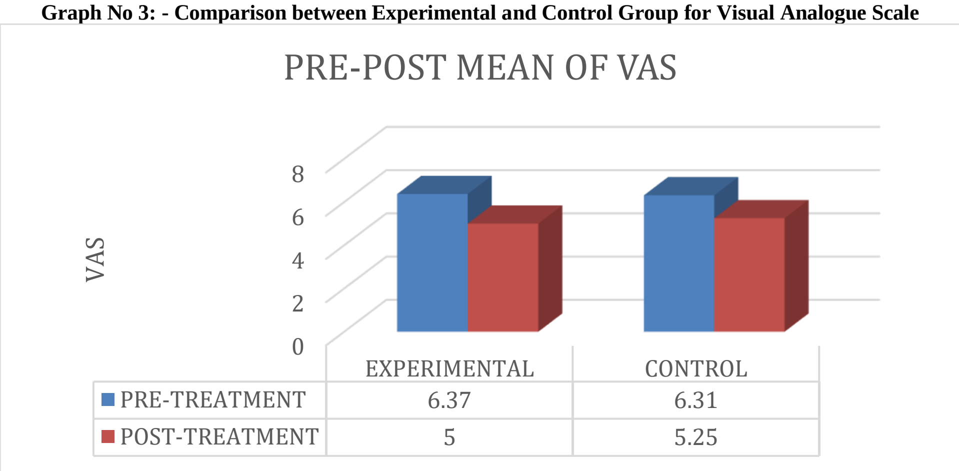


COMMENT - Graph 2 Experimental Group External Rotation - Significant increase from pre (21.56) to post (37.81). Control Group External Rotation - Significant increase from pre (17.85) to post (25.00). Table 2 Pre-External Rotation - No significant difference (p = 0.260) Post External Rotation - Experimental group showed significant increase (p = 0.005).

Table No 3: - Comparison between Experimental and Control Group for Visual Analogue Scale

Visual Analogue Scale		Mean ± Sd	Mean Ranks	Mann Whitney Score	P-Value
Pre-Treatment	Experimental	6.37 ± 0.95	16.22	100.5	0.61
	Control	6.21 ± 1.05	14.68		
Post-Treatment	Experimental	5.00 ± 1.26	15.13	106	0.79
	Control	5.14 ± 1.16	15.93		

Graph No 3: - Comparison between Experimental and Control Group for Visual Analogue Scale



COMMENT: - Graph 3 Experimental Group- Pre - Improved significantly from 6.37 to 5.00. Control Group - Pre - Improved significantly from 6.31 to 5.25. Table 3 Pre VAS - No significant difference ($p = 0.618$). Post VAS - No significant difference ($p = 0.796$).

DISCUSSION

The aim of our study was to investigate the effectiveness of a single session of Myofascial release technique (MFR) along with Muscle Energy Technique (MET) on Range of Motion (ROM) and pain in patients with shoulder impingement syndrome. The experimental group received a treatment regimen involving MFR along with MET, while the control group received conventional physiotherapy treatment involving stretching with ultrasound. Our results revealed a significant difference in Range of Motion, specifically in abduction and external rotation, between the experimental and control groups ($p < 0.05$). This notable improvement in range of motion can be attributed to the combined effect of both MFR along with MET.

Regarding the effect of Myofascial release technique, sustained pressure applied in related techniques induces reactive hyperaemia, leading to a release of muscle fiber tension. Additionally, increased blood flow facilitates the removal of biochemicals known to accumulate in myofascial trigger points. Another proposed mechanism involves the neurological aspect, where tactile stimulation of a painful area leads to pre-synaptic inhibition of slow, pain-transmitting nerve fibers. These effects collectively contribute to the analgesic properties of Myofascial release technique. [8]

A Pilot Study conducted by Dash et al. to compare the effect of Immediate Effect of Mobilization vs Myofascial Release on Pain and Range of Motion in Patients with Shoulder Impingement Syndrome. From results of their study, they concluded that MFR can be used as an initial treatment for pain reduction among SIS individuals. [9]

Regarding the Effect of MET, the underlying mechanism of Muscle Energy Technique involves the activation of Golgi Tendon Organs (GTOs), specialized mechanoreceptors found in skeletal muscles. GTOs respond to high levels of muscular force and play a crucial role in inhibiting muscle activity, thus preventing musculoskeletal injuries. When GTOs are stimulated, they trigger afferent fibers that provide inhibitory input to efferent α-motor neurons in the spine, ultimately leading to muscle relaxation. This phenomenon, known as the 'inverse stretch' or 'autogenic' reflex, was instrumental in achieving increased range of motion in our study. [10]

Our findings are consistent with the research conducted by Moore et al., which demonstrated immediate improvements in glenohumeral joint abduction and internal rotation Range of Motion after a single application of Muscle Energy Technique in asymptomatic individuals. This further supports the effectiveness of MET in enhancing joint mobility. [11]

In terms of pain reduction, while we observed a clinical decrease in pain levels, the statistical analysis did not yield a significant difference between the experimental and control groups ($p > 0.05$). It's important to note that despite the lack of statistical significance, the clinical improvement in pain underscores the potential benefits of the interventions.

CONCLUSION

This study concluded that a single session of myofascial release technique and muscle energy technique showed immediate improvement in the glenohumeral abduction and External rotation ROM.

Declaration by Authors

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Study was approved by Institutional Ethics Committee of Dr. Ulhas Patil College of Physiotherapy, Jalgaon.

REFERENCES

1. Creech JA, Silver S. Shoulder impingement syndrome.
2. Singh S, Gill S, Mohammad F, Kumar S, Kumar D, Kumar S. Prevalence of shoulder disorders in tertiary care centre. Int J Res Med Sci. 2015 Mar;3(4):917-20.
3. Kisner C, Colby LA. Therapeutic Exercise: Foundations and Techniques. Philadelphia: F.A. Davis Company; 2012.
4. Page P. Shoulder muscle imbalance and subacromial impingement syndrome in overhead athletes. International journal of sports physical therapy. 2011 Mar;6(1):51.
5. Alburquerque-Sendín F, Camargo PR, Vieira A, Salvini TF. Bilateral myofascial trigger points and pressure pain thresholds in the shoulder muscles in patients with unilateral shoulder impingement syndrome: a blinded, controlled study. The Clinical journal of pain. 2013 Jun 1;29(6):478-86.
6. Fieseler G, Laudner KG, Irlenbusch L, Meyer H, Schulze S, Delank KS, Hermassi S, Bartels T, Schwesig R. Inter-and intrarater reliability of goniometry and hand held dynamometry for patients with subacromial impingement syndrome. Journal of exercise rehabilitation. 2017 Dec;13(6):704.
7. Bijur PE, Silver W, Gallagher EJ. Reliability of the visual analog scale for measurement of acute pain. Academic emergency medicine. 2001 Dec;8(12):1153-7.
8. Wilke J, Vogt L, Banzer W. Immediate effects of self-myofascial release on latent trigger point sensitivity: a randomized, placebo-controlled trial. Biology of sport. 2018 Aug 31;35(4):349-54.
9. Dash NP, Pradhan DK. Immediate Effect of Mobilization vs Myofascial Release on Pain and Range of Motion in Patients with Shoulder Impingement Syndrome: A Pilot Randomized Trial. Indian Journal of Physiotherapy & Occupational Therapy. 2020 Apr 1;14(2).
10. Waxenbaum JA, Lu M. Physiology, muscle energy.
11. Moore SD, Laudner KG, Mcloda TA, Shaffer MA. The immediate effects of muscle energy technique on posterior shoulder tightness: a randomized controlled trial. Journal of orthopaedic & sports physical therapy. 2011 Jun;41(6):400-7.

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