

Impact of Muscle Energy Techniques in Alleviating Pain and Enhancing Functionality in Adhesive Capsulitis: A Narrative Review

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Abstract

Background: Frozen shoulder, or adhesive capsulitis, is an idiopathic condition marked by spontaneous shoulder pain and restricted movement in all directions, affecting 2%-5% of the general population. It leads to painful, gradual loss of range of motion (ROM), resulting in difficulties with daily activities and overhead movements. While various electrotherapeutic modalities and manual techniques have been studied, there is limited research on the effectiveness of Muscle Energy Technique (MET) for adhesive capsulitis. MET is a non-invasive osteopathic manipulation that uses isometric contractions to normalize joint ROM, reduce pain, and improve musculoskeletal function, making it beneficial for this condition.

Aims and Objectives: To study and review the available evidence on the Impact of Muscle Energy Technique in alleviating pain and enhancing functionality in adhesive capsulitis.

Methodology: A comprehensive electronic literature search was performed across PubMed, ScienceDirect, and Google Scholar databases using PICO framework criteria and Boolean operators (AND, OR). Search terms included "adhesive capsulitis," "frozen shoulder," "muscle energy technique," combined with "pain," "range of motion," and "functional disability." Filters were applied for English language, human subjects, and study types including randomized controlled trials and clinical trials. From 32 initially retrieved articles, titles and abstracts were screened against predefined inclusion criteria: adult patients with adhesive capsulitis, MET as intervention, measurable outcomes using validated assessment tools, and peer-reviewed publications. Exclusion criteria eliminated case reports, studies with secondary shoulder pathologies, inadequate methodology, and non-English publications. Following rigorous screening and quality assessment, 12 studies met the eligibility criteria and were selected for qualitative synthesis and analysis.

Results: Post-intervention analysis revealed statistically significant improvements in at least one primary outcome measure across the reviewed studies, including pain reduction, increased range of motion, and enhanced functional capacity.

Conclusion: Current evidence supports Muscle Energy Technique as an effective therapeutic intervention for adhesive capsulitis management. The technique demonstrates significant benefits in pain relief and

functional restoration, warranting its inclusion in comprehensive treatment protocols for patients with frozen shoulder syndrome.

Keywords: Adhesive capsulitis, Frozen shoulder, Periarthritis, Muscle energy Techniques, Pain, Functions, Functional Disability.

INTRODUCTION

Adhesive capsulitis (AC), commonly referred to as frozen shoulder, is a musculoskeletal disorder characterized by persistent pain, stiffness, and a progressive loss of glenohumeral joint range of motion (ROM).^[1] It affects approximately 2–5% of the general population and is most prevalent among middle-aged adults, particularly women between 40 and 60 years of age.^[2,3] The underlying pathology involves thickening, contraction, and fibrosis of the joint capsule, accompanied by adhesion formation that restricts shoulder mobility and causes significant functional limitations.^[4] Patients typically report pain during movements such as overhead reaching, abduction, and external rotation motions essential for everyday activities. Consequently, adhesive capsulitis greatly impacts an individual's ability to perform activities of daily living (ADLs) and affects overall quality of life.^[5]

Adhesive capsulitis progresses through three characteristic stages. The first stage, known as the *freezing phase*, begins with a gradual onset of shoulder pain that often worsens at night and may radiate down the arm. During this period, the range of motion becomes progressively limited, and the phase typically lasts for about three to six months.^[6] The second stage, called the *frozen or stiffness phase*, is marked by a decrease in pain intensity but a significant restriction in shoulder movement. Patients commonly experience difficulty performing daily activities such as reaching behind the back or combing their hair, and muscle atrophy around the shoulder may become evident. This phase can persist for three to eighteen months. The final stage, referred to as the *thawing or resolution phase*, is characterized by a gradual return of movement and function.^[7] With appropriate interventions such as structured physical therapy or, in some cases, surgical procedures, the recovery process during this stage may be accelerated.

The functional impairment caused by adhesive capsulitis extends beyond physical discomfort. Individuals frequently struggle with routine activities such as dressing, grooming, reaching overhead, or lifting objects, which compromises independence and reduces social and occupational participation.^[8] The chronic pain and prolonged functional limitation often result in emotional distress, anxiety, and depression, further diminishing quality of life and overall well-being.^[9,10,11] The self-limiting and prolonged course of the condition lasting several months to years necessitates early and effective intervention strategies aimed at pain relief, restoration of mobility, and prevention of secondary complications.

Conservative management remains the primary approach to treating adhesive capsulitis, with physiotherapeutic interventions playing a central role. Physical therapy modalities such as thermotherapy, ultrasound, transcutaneous electrical nerve stimulation (TENS), and specific exercise regimens are commonly employed to relieve pain and restore shoulder mobility. Manual therapy techniques, in particular, have shown promising outcomes by targeting soft tissue flexibility, joint mobilization, and capsular extensibility. Among these, the Muscle Energy Technique (MET) has gained increasing clinical attention for its dual role in reducing pain and improving functional movement patterns.^[12,13,14,15]

Muscle Energy Techniques are a form of manual therapy originating from osteopathic medicine that utilize the patient's voluntary muscle contractions against controlled resistance applied by the therapist. Unlike passive stretching or joint mobilization, MET involves active patient participation, allowing for dynamic

neuromuscular control and enhanced proprioceptive engagement. This active approach not only improves mechanical flexibility but also facilitates neuromuscular re-education, reduces muscle hypertonicity, and elongates shortened soft tissues. The physiological basis of MET lies in the principles of post-isometric relaxation (PIR) and reciprocal inhibition (RI), both of which promote muscle relaxation and joint mobility through neuromuscular pathways^[16]

During MET application, a patient performs a gentle, isometric contraction of the affected muscle group against the therapist's resistance, followed by a relaxation phase that allows the muscle to lengthen further. This process enhances tissue extensibility, reduces muscle spasm, and improves tolerance to stretch. The repeated contraction-relaxation cycles stimulate proprioceptors and help restore balanced muscle activation patterns. Through this combination of mechanical and neurological effects, MET contributes to increased joint range of motion, pain reduction, and overall improvement in shoulder function^[17]

In adhesive capsulitis, MET has been proposed to facilitate recovery through three interrelated mechanisms neuromuscular facilitation and relaxation, soft tissue elongation and adhesion resolution, and enhancement of functional recovery. First, MET promotes neuromuscular facilitation by harnessing PIR and RI mechanisms, which help relax hypertonic muscles and reduce guarding around the shoulder joint. The voluntary isometric contractions against therapist-applied resistance improve proprioceptive feedback, enhance motor control, and reduce the pain associated with capsular tightness. This neuromuscular re-education aids in the restoration of smoother, coordinated movement patterns essential for regaining normal shoulder function^[18,19]

Second, MET mechanically targets periarticular soft tissues such as the capsule, ligaments, and fascia. The controlled muscle contractions and subsequent stretches facilitate soft tissue elongation and may help disrupt fibrotic adhesions that restrict joint mobility. Compared to passive stretching, MET's active component engages both neurological and mechanical mechanisms, resulting in more effective tissue remodeling and long-term improvements in flexibility. Several comparative studies have suggested that MET can achieve greater gains in range of motion and pain relief than traditional stretching or mobilization techniques, such as Mulligan mobilizations, owing to its combined mechanical and neuromuscular influence.^[13,20,21]

Third, the integration of improved muscle relaxation, tissue extensibility, and enhanced proprioception through MET ultimately contributes to superior functional recovery. Patients experience reduced pain, improved confidence in movement, and increased willingness to engage in physical activity, which is essential for sustainable rehabilitation outcomes. The active participation required in MET sessions fosters better adherence to treatment programs and encourages continued exercise beyond the clinical setting, thereby supporting long-term recovery and minimizing the likelihood of recurrence.^[12,23,24]

Given the multidimensional impact of adhesive capsulitis affecting not only physical function but also psychological well-being effective rehabilitation strategies must address both aspects simultaneously. MET, by combining physical reconditioning with neuromuscular engagement, offers a holistic therapeutic approach that aligns with these goals. Its application in adhesive capsulitis has demonstrated promising outcomes in terms of pain reduction, improved range of motion, and functional enhancement.^[19,23,25,26]

Muscle Energy Techniques (METs) have been extensively utilized in the management of various musculoskeletal disorders, including sacroiliac joint dysfunction, low back pain, and pregnancy-related pelvic girdle pain.^[27,28] These techniques serve multiple therapeutic purposes, such as lengthening shortened muscles, enhancing the strength of weakened musculature, alleviating pain, improving local circulation, and facilitating joint mobilization. Beyond their rehabilitative applications, METs are also

employed in preventive practice, particularly among athletes, to maintain optimal muscle balance and minimize the risk of future musculoskeletal injuries.

Clinically, METs are recognized for their ability to enhance flexibility, induce muscle relaxation, and restore joint range of motion (ROM) through active patient participation and precise therapist-guided resistance. The safety and adaptability of METs allow their application across nearly all major joints of the body, making them a valuable component of contemporary physiotherapeutic interventions. Despite growing clinical interest, existing research on the effectiveness of MET in adhesive capsulitis remains varied in design, methodological rigor, and outcome measurement. Therefore, a comprehensive review of current evidence is essential to understand its therapeutic potential and to guide clinicians in developing effective, evidence-based treatment protocols. The present review aims to investigate the effectiveness of Muscle Energy Technique (MET) in alleviating pain and enhancing functionality in patients with adhesive capsulitis.

OBJECTIVES OF THE STUDY:

- To compare the effectiveness of MET with a control group receiving standard physical therapy in reducing pain levels in patients with adhesive capsulitis.
- To evaluate the impact of MET on improving range of motion in the shoulder joint of patients with adhesive capsulitis.

METHODOLOGY

A literature search and review were performed using Google Scholar, PubMed Scholar and PubMed. The search was limited to articles published within past 10 years. The focus of search was to rule out the Impact of Muscle Energy Technique in Alleviating Pain and Enhancing Functionality in Adhesive Capsulitis Patients.

Search Strategies:

Keywords Used: Medical subject headings [MeSH] were used to find relevant keywords. The keywords from other relevant articles were also used. The following keywords were used Adhesive capsulitis, frozen shoulder, periarthrititis, Muscle energy techniques, Pain, functions, functional disability.

Databases Searched: PubMed, Science direct, google scholar, PEDro (Physiotherapy Evidence Database)

Search Techniques

Keywords: Adhesive capsulitis, Frozen shoulder, Periarthritis, Muscle energy Techniques, Pain, Functions, Functional Disability.

The search techniques used for getting articles for this literature review are:

The Boolean operators 'OR' and 'AND' were used.

1. Muscle energy techniques AND Adhesive capsulitis OR Periarthritis OR Frozen shoulder AND Pain
117 articles
2. Adhesive capsulitis OR frozen shoulder OR periarthritis AND muscle energy technique AND pain AND functions OR functional disability – **30 articles**
3. "Muscle Energy Technique*" OR "MET" OR "Post-Isometric Relaxation" OR "PIR" – **3 articles**

Eligibility Criteria

Inclusion Criteria

- Articles in the English language
- Studies published in the last 10 years only
- Articles that include pain (VAS, NPRS) and Range of motion (flexion, abduction, internal or external rotation) functional ability (SPADI, DASH) as an outcome measure
- Studies conducted on Participants in any stage of adhesive capsulitis (freezing, frozen, or thawing)
- Study design such as Randomized controlled trials (RCTs), Interventional study & Experimental Study will be included.
- Studies using Muscle Energy Techniques (METs) as a primary treatment or as an adjunct to physiotherapy will be included.

Exclusion Criteria

- Article whose full text was not retrieved
- Articles apart from experimental studies
- Studies which were done on animals
- Studies with high risk of bias that fail minimum quality criteria

Selection of the study and Data Extraction

Data extraction will be performed independently by two reviewers to ensure accuracy and consistency. Any discrepancies or disagreements will be resolved through discussion and consensus between the reviewers. If necessary, the corresponding authors of the studies will be contacted to obtain missing, incomplete, or unclear information.

For this narrative review, only studies with a **PEDro score of 6 or higher** were included. Key data on participants, interventions, outcome measures, and findings were extracted and summarized. The effects of Muscle Energy Techniques (METs) on pain, range of motion, and functional outcomes in adhesive capsulitis were evaluated qualitatively, highlighting trends, consistencies, and gaps in the current literature.

A comprehensive search was conducted across multiple databases using the keywords mentioned above, yielding a total of **150** articles. The screening process was carried out in a **three-stage approach** based on the predefined inclusion and exclusion criteria:

- **Title screening:** 32 articles were selected based on relevance.
- **Abstract screening:** 15 articles were retained after reviewing abstracts.
- **Full-text screening:** 12 articles met all inclusion criteria and were included in the final review.

Thus, the **final number of studies included in this narrative review is 12**, all of which satisfy the eligibility criteria and methodological quality threshold.

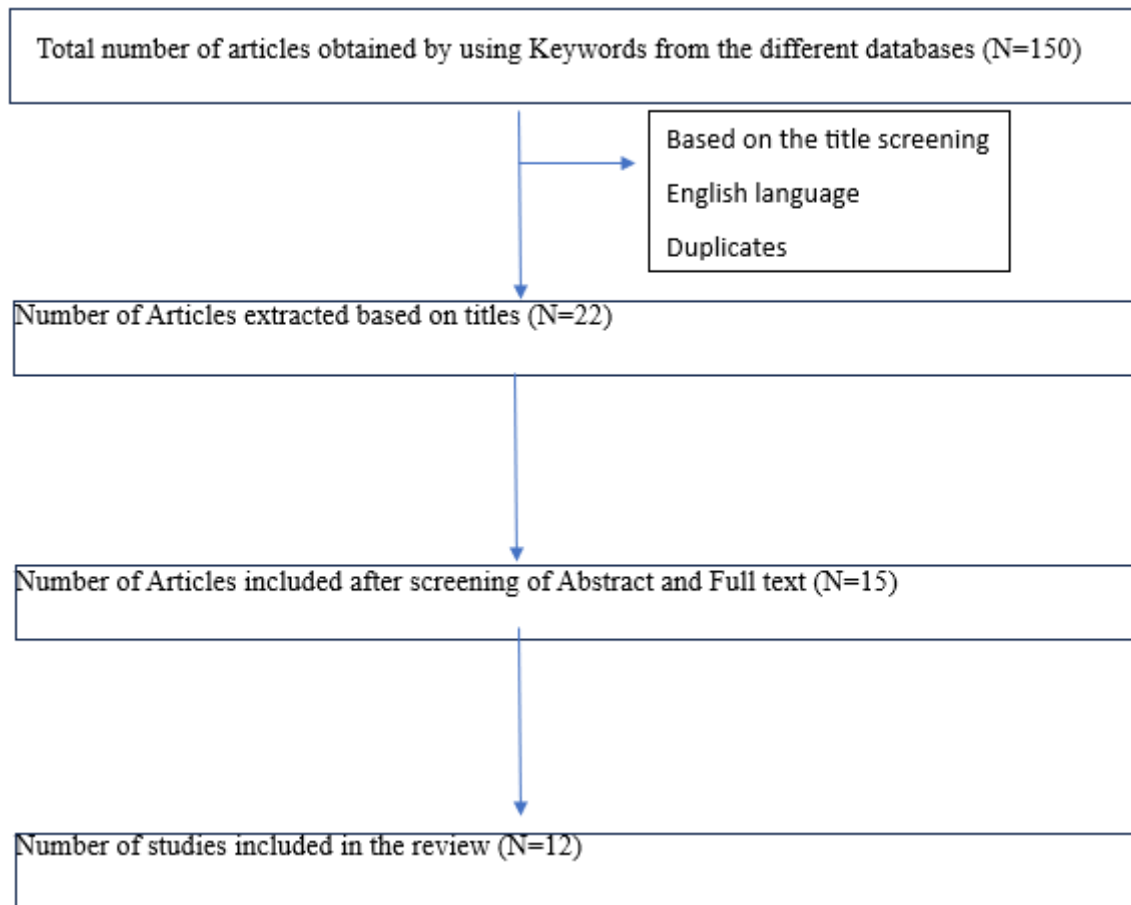


Fig 1: Flow of data Extraction

Summary of the Review

Sl.No	Title/Author/Year	Study design & Sample size	Intervention Duration, frequency, intensity of Intervention	Outcome & Outcome Measure	Evaluation Assessment	Result
1	Comparison of mulligan technique versus muscle energy technique in patients with adhesive capsulitis. [29] Khalil, R.et.al ,2022	RCT N= 78	Group A received Mulligan Mobilization with Movement (MMT), while Group B received Muscle Energy Technique for 6 Weeks	Pain intensity, ROM, Functional disability were measured using the Visual Analogue Scale, Goniometer, and SPADI	Assessment was taken Baseline, 3 rd & 6 th week for Pain, Range of Motion & Disability	Post-intervention difference showed significantly better results in MMT compared to METs (p<0.05)

	Pedro score 7/10					
2	Comparing the effects of muscle energy technique and mulligan mobilization with movements on pain, range of motion, and disability in adhesive capsulitis. ^[30] Razzaq A. et.al,2022 Pedro score 6/10	RCT N=64	Both groups received conventional treatment comprising hot packs, pulley rope exercises, wall climbing, and shoulder wheel exercises. In addition, Group A received Mulligan Mobilization with Movement, while Group B received Muscle Energy Technique. Each technique was applied 5 times per set, with 2 sets per session, 3 days a week for 3 weeks.	Pain, Range of motion, and Disability using the Visual Analogue Scale (VAS), Goniometric measurements & SPADI	Assessment was taken Baseline and Post intervention for Pain, Range of Motion & Disability	Muscle energy technique and Mulligan mobilisation with movement were both found to be effective, but the Mulligan was significantly (p<0.05) better compared to the METs.
3	Effects of proprioceptive neuromuscular facilitation stretch and muscle energy technique in the management of adhesive	An Experimental Study N=60	a) Proprioceptive neuromuscular facilitation technique PNF – D2 pnf pattern of Flexion5 and extension 8reps/set ,2 sets per session, 1 session per day,5 days a week, each rep	Range of motion, pain and function using Universal goniometer, University of Pennsylvania [1st subset] shoulder score	Evaluation was done prior to studies, at the end of 1st week, and at the end of 2nd week	PNF showed greater improvements in pain, ROM, and restoring function than METs (p<0.05)

	capsulitis of shoulder. ^[31] Ravichandra n H et al. 22 2021		maintained for 5-10 secs b) METs- 5reps/set, 5 sets/session, 1 session/day, 5 days/week, for 2 weeks, each rep maintained for 7-10 secs			
4	Effectiveness of muscle energy technique versus capsular stretching among patients with adhesive capsulitis. ^[32] Sharma H et al. 2020	An Experimental Study N= 30	a) Capsular stretching with conventional therapy (hot pack, Codman's exercises, pulley rope, and finger ladder). Stretch held for 30 seconds, 5 repetitions per set, 3 sets per session, 5 sessions per week for 3 weeks. b) Muscle Energy Technique (MET) with the same conventional therapy, performed with 5 repetitions per set, 3 sets, against minimal resistance, each contraction held for 7-10 seconds.	Pain, shoulder function, Range of motion & Disability using NPRS Goniometry, SPADI	The assessment was taken pre-treatment and post –treatment after 3 weeks	Significant decrease in pain and improved ROM and functional disability in the patients who received METs along with conventional therapy (p<0.05) when compared to capsular stretching with conventional treatment

5	Comparison of Spencer muscle energy technique and Passive stretching in adhesive capsulitis. [33] Iqbal M et al. 17 2020 Pedro Scale 8/10	A single blind randomized control trial N=60	a) METs, 3-5 repetitions with slight resistance offered by therapist, with rest intervals ,3 sessions per week on alternate days for 4 weeks Hot pack; 7-10 minutes b) Hot pack, 7-10minutes Passive stretching ;20 secs with 10secs rest ,10 repetitions over 3 sessions per week for 4 week	Pain, disability, range of motion using DASH questionnaire, SPADI, NPRS, Universal Goniometry Index	Assessment was taken pre-treatment and 2nd and 4th week of post treatment	The difference between the groups in terms of pain and disability markers was non significant, but had significant difference at midway and post-intervention assessment in group which was given METs, (p<0.05) and was with range of motion
6	A Comparative study on effectiveness of muscle energy technique versus Cyriax's deep friction technique in adhesive capsulitis. [34] Vijayan V et al. 21 2019	An Experimental study N=30	a) METs, 5 secs hold against slight resistance,5 reps/set 5sets per session/ 5days a week for 3 weeks b) Cyriax's deep friction- 15 mins per session ,5 times a week, for 3 weeks	Pain and disability, Range of motion using SPADI Goniometry	Evaluation was done on prior to treatment and 21 days after treatment	Both treatment groups showed improvement comparing pre and post treatment while group A(p-0.1117) showed significant difference compared to group B in terms of ROM and

						functional disability
7	Efficacy of mulligan technique versus muscle energy technique on functional ability in subjects with adhesive capsulitis. ^[35] Rayudu, G. M et.al, 2018 Pedro Scale 7/10	RCT N=80	1. MMT 3 sets of 10 repetitions with 30 secs rest between sets ,3 sessions in a week for 3 weeks 2. METs – 5 repetition per set for 3 sets with slight resistance by the therapist, 3 sessions per week for 3 weeks	Pain and disability, range of motion SPADI, Universal goniometry index	The assessment was done on first day of treatment and last day of treatment [after 3 weeks]	Both techniques were equally effective and there was improvement within group but no statistical and clinical significance was found in between-group comparison
8	Effects of muscle energy technique on pain and function in Adhesive capsulitis. ^[36] Gill M K A et.al 2018	An Interventional study N=27	Group A (n=14): Conventional physiotherapy including hot packs (10 min), Codman's, finger ladder, wand, active exercises, and capsular stretching. Group B (n=13): Muscle Energy Technique for shoulder flexion, abduction, internal and external rotation, along with the same conventional physiotherapy. MET protocol: 5	VAS, SPADI and upper extremity goniometry chart	The assessment was taken pre-treatment and post –treatment after 2weeks	Both conventional physiotherapy and MET with conventional physiotherapy were effective in reducing pain and improving range of motion and functional ability in adhesive capsulitis, with MET combined with

			repetitions per set, 3 sets per session, 1 session per day for 2 weeks.			conventional physiotherapy showing superior results. p value <0.001
9	Effects of muscle energy technique and specific inferior capsular stretching in frozen shoulder. [37] Sheikh MK et al. 2017	An Experimental study N=30	a) METs, moist heat, moist heat, Inferior capsule stretching maintained for 30sec 3reps/set, 5 sets per session /5days -4 weeks b) METs, 7secs hold against slight resistance 3reps/set, 5sets per session/ 5days a week for 4 weeks	Pain, shoulder disability, Range of motion using VAS, SPADI, Goniometric measurement	Assessment was taken pre-interventional and 4 weeks postinterventional	The outcome measures VAS, SPADI and ROM showed extreme significance in group A (p<0.0001) than group B
10	Effects of Spencer Muscle energy technique on pain and functional disability in case of adhesive capsulitis of shoulder joint. [16] Saifee E et al. 2016	An Interventional study N= 30	a) METs 4weeks/3days a week and once a day and conventional treatment b) Conventional treatment – SWD – capacitor field method for 20 mins, Codman's exercise, rope and pulley, wall and ladder, shoulder wheel and self-stretching exercises 4weeks /3 days	Pain, shoulder disability using VAS, SPADI	Pre-treatment data was collected before the treatment and 4 weeks post treatment outcome data was collected	Both groups showed significant improvements in terms of VAS and SPADI, but more significant improvement in group A in terms of SPADI (p- 0.0001) but not in VAS

			per week /once a day			
11	Comparative effectiveness of low-level laser therapy versus muscle energy technique among diabetic patients with frozen shoulder. ^[38] Halima et.al., 2024	RCT N= 60	a). The first intervention, low-level laser therapy (LLLT), uses low-intensity laser light 810 nm wavelength, 60 mW output, power density 5.4 J/cm², 30 s per area) applied to the affected shoulder b) MET protocol targeting shoulder flexion, abduction and external rotation restrictions (e.g., ~20% maximal effort contraction for 7–10 s followed by barrier stretch, repeated and progressed) followed by CTE c) Conventional therapeutic exercises (e.g., pendulum, overhead arm, finger wall ladder, pulley, hand-behind-back, external rotation) repeated 5-10	Shoulder function measured by SPADI). Pain intensity by NPRS, shoulder ROM, IL-6 levels, depression & anxiety (HADS), QoL	Assessed at baseline, at post 8-week intervention, and at 3 months follow-up.	Both techniques were equally effective and there was improvement in all the outcomes

			times per session. All three groups received treatment for 3 times per week for 8 weeks (total 24 sessions), with follow-up at 3 months			
12	Efficacy of muscle energy technique on functional ability of shoulder in adhesive capsulitis. [39] Anupama N et al. 2014 Pedro scale 6/10	RCT N=30	Muscle energy technique 3 repetitions per set, 1 session per day and thrice a week for 5 weeks with conventional physiotherapy b) Conventional physiotherapy treatment; ultrasound, hot pack, Codman's exercise, pulley exercise and active assisted exercises.	Pain and disability using SPADI	Assessment was taken pre-treatment and post treatment	Both the groups showed improvements in SPADI scores, but the group which was given METs with conventional physiotherapy showed greater improvement 37.53±11.74 in terms of SPADI score

DISCUSSION

This Narrative review examined the therapeutic efficacy of Muscle Energy Technique in managing adhesive capsulitis through analysis of nine studies. The primary objective centered on determining MET's influence on pain reduction and functional restoration of the shoulder joint. Data interpretation across the selected literature consistently demonstrated MET's effectiveness alongside conventional physiotherapy interventions in addressing key variables including pain intensity, joint mobility, and functional capacity. Pain reduction following MET can be attributed to multiple physiological mechanisms. Isometric contractions during MET stimulate mechanoreceptors, activating descending inhibitory pathways, including the periaqueductal Gray (PAG), which modulate pain perception [40,41]. MET also influences

local circulatory biomarkers and reduces inflammatory mediators, contributing to decreased nociceptive input and enhanced tissue healing ^[12]. Mallick et al.2024 and Gupta et al.2024 reported significant reductions in Visual Analog Scale (VAS) scores and improvements in functional assessments such as the Shoulder Pain and Disability Index (SPADI) following MET interventions. ^[40,42]

Comparative analyses suggest MET demonstrates comparable or superior efficacy to other physiotherapy techniques. Studies comparing MET with Cyriax deep friction, Mulligan mobilization, and inferior capsular stretching reported greater improvements in pain, ROM, and functional outcomes when MET was applied either alone or in combination with conventional physiotherapy. Naz et al.2022 found that MET produced significantly better improvements in shoulder abduction and flexion than passive stretching.^[43] Kang et al. 2012 observed those patients receiving MET alongside conventional therapy achieved faster ROM gains and greater pain relief than those receiving conventional therapy alone.^[44] These findings indicate that MET may provide additive benefits when integrated into comprehensive rehabilitation programs.

ROM improvements observed with MET are primarily attributed to reflex relaxation, viscoelastic tissue adaptation, autogenic inhibition mediated by the Golgi tendon organ, and reciprocal inhibition of antagonist muscles. These mechanisms facilitate elongation of shortened musculature, reduction of soft tissue stiffness, and increased joint mobility, allowing patients to achieve pain-free movement. Short-duration isometric contractions, typically 5–10 seconds, are sufficient to induce significant improvements in ROM and muscle flexibility.

Functional outcomes, as measured by Quick-DASH and SPADI, consistently indicate enhanced upper limb performance following MET interventions. Improved flexibility and pain reduction enable patients to perform ADLs with less difficulty, emphasizing the clinical relevance of MET in rehabilitation. Combining MET with adjunctive physiotherapy modalities such as ultrasound, Codman's pendulum exercises, finger ladder exercises, and general ROM exercises over 4–5 weeks has been shown to yield further improvements in pain, ROM, and functional independence.

Patients with diabetes may require longer or more intensive interventions to achieve similar benefits due to delayed tissue healing and chronicity of adhesive capsulitis. Overall, the synthesized evidence from twelve studies provides robust support for Muscle Energy Technique as an effective intervention for adhesive capsulitis, demonstrating significant therapeutic benefits across pain, range of motion, and functional capacity domains. The consistency of positive findings across investigations with varying designs, populations, and protocols strengthens confidence in MET's clinical value. Statistical analyses consistently revealed significant improvements in Visual Analog Scale scores, Shoulder Pain and Disability Index assessments, and objective range of motion measurements following MET intervention.

LIMITATIONS OF THE STUDY

1. Small sample sizes, heterogeneous MET protocols, and varied outcome measures limit generalizability and cross-study comparisons.
2. Lack of standardized diagnostic criteria, insufficient subgroup analyses, and limited reporting on comorbidities (e.g., diabetes) reduce clarity on patient-specific effectiveness.
3. Blinding is challenging in manual therapy studies, increasing risk of performance and detection bias.
4. Short follow-up periods limit understanding of long-term effects and sustainability of treatment benefits.
5. Most studies are conducted in controlled research settings, reducing external validity for real-world

clinical practice.

FUTURE RESEARCH RECOMMENDATIONS

1. Conduct large-scale, multi-center randomized trials with standardized MET protocols and long-term follow-up.
2. Compare MET with other manual and invasive interventions to determine relative effectiveness.
3. Explore mechanistic studies and objective outcome measures to understand how MET works physiologically.

CONCLUSION

Muscle Energy Technique (MET) is a safe, effective, and non-invasive intervention for managing adhesive capsulitis, demonstrating significant improvements in pain, range of motion, and functional ability. Evidence indicates that MET, particularly when combined with conventional physiotherapy, offers superior outcomes compared to other manual therapy techniques. While current studies support its clinical utility, further high-quality, large-scale, and long-term trials are needed to standardize protocols, evaluate durability of effects, and compare MET with alternative interventions. Incorporating MET into comprehensive rehabilitation programs can enhance patient outcomes and functional independence, making it a valuable component of evidence-based management for adhesive capsulitis.

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