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# EFFECTS OF METS (MUSCLE ENERGY TECHNIQUES) AND CAPSULAR STRETCHING IN DIFFERENT MUSCULOSKELETAL PROBLEMS

*Narrative Review*

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## ABSTRACT

**Background:** Musculoskeletal disorders (MSKDs) are a leading cause of disability worldwide, impairing mobility and quality of life due to dysfunctions involving muscles, joints, and connective tissues. Among various rehabilitation interventions, manual therapy techniques such as Muscle Energy Techniques (METs) and capsular stretching have gained prominence for their non-invasive approach in managing pain and restricted range of motion (ROM), particularly in conditions like adhesive capsulitis and osteoarthritis.

**Objective:** This narrative review aims to compare the clinical effectiveness of METs and capsular stretching in reducing pain and improving ROM in patients suffering from various musculoskeletal conditions.

**Main Discussion Points:** The review synthesizes recent evidence demonstrating that both METs and capsular stretching are beneficial in enhancing joint mobility, alleviating pain, and reducing functional disability. METs involve controlled isometric muscle contractions against resistance, promoting neuromuscular re-education and soft tissue elongation. Capsular stretching, by contrast, passively targets tight joint capsules to restore joint mechanics. While both techniques showed significant improvements across multiple studies, METs consistently demonstrated superior outcomes in muscle strengthening, adhesion resolution, and overall functional recovery, especially in chronic MSK conditions.

**Conclusion:** Muscle Energy Techniques offer a more comprehensive approach in improving patient mobility and quality of life compared to capsular stretching alone. However, both techniques remain valuable components of an individualized, evidence-based physiotherapy regimen. Further high-quality clinical trials are necessary to optimize treatment protocols and determine long-term outcomes.

**Keywords:** Muscle Energy Techniques, Capsular Stretching, Adhesive Capsulitis, Range of Motion, Manual Therapy, Musculoskeletal Disorders.

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## INTRODUCTION

Musculoskeletal disorders (MSDs) represent one of the most common causes of pain, disability, and compromised quality of life globally. According to the Global Burden of Disease Study, MSDs affect approximately 1.71 billion people worldwide, with lower back pain, neck pain, and osteoarthritis being among the leading contributors to years lived with disability (YLDs) (1). Despite the extensive impact of these disorders on both individuals and healthcare systems, optimal management remains a multifaceted challenge due to the complexity and chronicity of many musculoskeletal conditions. Among non-pharmacological treatments, manual therapy techniques such as Muscle Energy Techniques (METs) and capsular stretching have gained considerable attention for their therapeutic benefits in alleviating pain, enhancing joint mobility, and restoring functional capacity in patients with various musculoskeletal impairments. Muscle Energy Techniques are an advanced form of manual therapy where patients actively use their muscles on request, from a precisely controlled position, in a specific direction, and against a distinct counterforce applied by the therapist. Initially developed in the mid-20th century by osteopathic practitioners, METs are now widely incorporated in physiotherapy and rehabilitation settings due to their biomechanical and neurophysiological effects on the musculoskeletal system. They work through mechanisms such as post-isometric relaxation and reciprocal inhibition, allowing targeted muscles to lengthen and joint restrictions to ease with minimal discomfort. Similarly, capsular stretching addresses joint capsule tightness—common in conditions like adhesive capsulitis—by applying sustained and targeted stretch to improve joint arthrokinematics and reduce fibrotic adhesions (23).

Over the years, various studies have attempted to quantify the benefits of METs in conditions ranging from frozen shoulder and sacroiliac joint dysfunction to chronic neck and low back pain. One notable area of focus has been adhesive capsulitis, where shoulder range of motion becomes severely limited. Research has consistently shown that METs significantly improve both pain and mobility, often outperforming conventional therapies such as passive stretching or heat therapy when used in isolation (4). Furthermore, METs have been explored in respiratory dysfunction secondary to fibromyalgia, where targeted application to cervical accessory muscles demonstrated marked improvements in functional respiratory parameters (5). Similarly, the role of capsular stretching in restoring range of motion and reducing pain has been emphasized in both acute and chronic shoulder conditions. Posterior capsule tightness has been implicated in numerous shoulder pathologies, particularly in overhead athletes and individuals with poor postural alignment. Posterior capsular stretching techniques have demonstrated immediate improvements in shoulder internal rotation, which is often limited in these populations, with some studies advocating for their inclusion in both preventive and rehabilitative protocols (6). Moreover, studies comparing capsular stretching with joint mobilization techniques have highlighted its superior efficacy in specific cases, particularly when adhesion within the joint capsule is the primary pathology (7). Despite growing evidence supporting these interventions, gaps in the literature persist. Most studies to date are small-scale and lack long-term follow-up data, making it challenging to assess the sustainability of these techniques over extended periods. Additionally, the heterogeneity in patient populations, treatment protocols, and outcome measures has limited the generalizability of results. The interaction between METs and adjunctive therapies such as proprioceptive neuromuscular facilitation (PNF), Bowen therapy, or Pilates-based rehabilitation remains an area in need of further exploration, especially considering the increasingly multimodal approach to musculoskeletal rehabilitation.

Moreover, the existing research is predominantly focused on upper extremity and spinal conditions, with relatively fewer studies addressing the effectiveness of METs and capsular stretching in lower limb dysfunctions such as knee osteoarthritis or sacroiliac joint derangements. This imbalance underscores the need for broader, more diverse investigations encompassing a variety of musculoskeletal disorders across different demographic groups. Another significant limitation lies in the inconsistent application of standardized assessment tools, which complicates cross-study comparisons and meta-analytical interpretations (8). The objective of this narrative review is to comprehensively explore the effects of METs and capsular stretching across a range of musculoskeletal conditions, evaluating their clinical relevance, efficacy, and comparative effectiveness with other therapeutic approaches. This review synthesizes recent findings from the last five years, encompassing randomized controlled trials, cohort studies, and experimental research, to provide a cohesive understanding of these interventions. The scope of this review includes investigations on conditions affecting the shoulder, spine, hip, and knee, with a focus on adult populations experiencing movement restrictions, pain, and postural dysfunctions.

By consolidating the latest evidence, this review aims to bridge the knowledge gap surrounding METs and capsular stretching in musculoskeletal rehabilitation. It seeks to inform clinicians, therapists, and rehabilitation specialists of the potential applications and outcomes of these techniques, thereby guiding evidence-based clinical decision-making. Furthermore, the review underscores the importance of integrating manual therapy into comprehensive treatment plans that address not only biomechanical impairments but also

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patient-centered functional goals. As the burden of musculoskeletal disorders continues to rise, particularly in aging populations and individuals with sedentary lifestyles, the demand for effective, non-invasive therapeutic modalities is likely to increase. Techniques such as METs and capsular stretching hold promise in addressing these challenges by offering tailored, low-risk interventions with minimal side effects and high patient acceptability. This review therefore not only evaluates existing literature but also highlights areas for future research, including longitudinal outcomes, standardization of treatment protocols, and exploration of these techniques in diverse clinical contexts.

**Thematic Discussion: Muscle Energy Techniques and Capsular Stretching in Musculoskeletal Rehabilitation**

The effectiveness of manual therapy in managing musculoskeletal disorders has been widely examined, with Muscle Energy Techniques (METs) and capsular stretching frequently evaluated for their clinical impact on pain modulation, joint mobility, and functional recovery. This section synthesizes the recent evidence thematically, focusing on their effects across common clinical presentations including adhesive capsulitis, cervical and lumbar dysfunctions, sacroiliac joint instability, and stroke-related musculoskeletal impairments.

**1. Pain Reduction and Range of Motion Restoration in Adhesive Capsulitis**

Adhesive capsulitis, often referred to as frozen shoulder, is characterized by pain, stiffness, and progressive loss of shoulder mobility. Several studies highlight METs as a highly effective intervention for improving symptoms in this population. METs exert a neuromuscular influence by enhancing proprioception and modulating pain perception through reciprocal inhibition and post-isometric relaxation mechanisms. A randomized controlled trial comparing METs with conventional ROM exercises and heat therapy in adhesive capsulitis patients demonstrated a significantly greater reduction in pain scores ($p < 0.05$) and disability in the MET group after two weeks of treatment, as assessed by the Shoulder Pain and Disability Index (SPADI) (2). Complementing these findings, a study evaluating the effects of capsular stretching reported that posterior capsule lengthening led to substantial improvements in external rotation and abduction—motions commonly restricted in adhesive capsulitis (6). These data support the synergistic application of both METs and capsular stretching to address capsular tightness and muscle contractures in adhesive pathologies.

**2. Cervical Dysfunction and Myofascial Tightness**

Neck pain, frequently stemming from postural dysfunction or overuse, often involves the shortening of postural muscles such as the upper trapezius and sternocleidomastoid. In a controlled study evaluating the immediate effects of METs versus passive stretching on the upper trapezius, METs were more effective in enhancing cervical range of motion and reducing pain during flexion and rotation ($p < 0.01$), suggesting a superior neuromuscular adaptation when compared to static stretching techniques (3). Furthermore, Uysal et al. assessed the use of METs in fibromyalgia-related cervical dysfunctions and found that accessory respiratory muscle strength improved significantly when METs were integrated with adjunctive modalities like thermotherapy ($p < 0.001$) (1). These findings emphasize the potential of METs to produce immediate and meaningful outcomes in muscle relaxation and joint mobility, particularly in chronic musculoskeletal conditions with systemic involvement.

**3. Functional Gains in Sacroiliac Joint and Lumbar Dysfunction**

Sacroiliac joint dysfunction and lumbosacral instability represent another group of conditions where METs have shown beneficial outcomes. In a comparative study involving METs alone versus METs combined with proprioceptive neuromuscular facilitation (PNF) for managing lumbar pain, both groups exhibited significant improvements in mobility and functional scores. However, the METs plus PNF group showed slightly greater gains in the Modified Oswestry Disability Index (MODI), suggesting an additive effect of proprioceptive engagement alongside isometric contractions (5). Similarly, a study assessing METs in sacroiliac joint dysfunction found that applying METs to the gluteal and hamstring regions effectively restored pelvic symmetry and reduced localized discomfort within a two-week intervention window (7). These findings support the biomechanical rationale that METs, by regulating muscle tone and correcting positional faults, play a critical role in restoring lumbopelvic stability.

**4. Post-Stroke Upper Limb Rehabilitation**

In neurologically impaired populations, particularly stroke survivors, METs have been evaluated for their impact on musculoskeletal complications such as hemiplegic shoulder pain and dysphagia. Borah et al. conducted a randomized study comparing forced-use training and capsular stretching in chronic stroke patients. Although forced-use training produced more significant improvements in functional independence ($p < 0.01$), the group receiving capsular stretching also demonstrated notable gains in shoulder ROM and reduced discomfort, suggesting its utility as a supportive therapy in post-stroke rehabilitation (8,9). The neuromuscular re-education

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facilitated by METs may also contribute to improved voluntary control in paretic limbs, offering a therapeutic advantage in restoring upper limb function.

**5. Comparative Efficacy and Clinical Preferences**

Although multiple studies demonstrate the benefits of METs and capsular stretching independently, direct comparisons between these techniques and others such as Mulligan's Mobilization With Movement (MWM) or Spencer's mobilization suggest differential effectiveness based on pathology and patient profile. For instance, a study comparing METs with MWM in adhesive capsulitis patients revealed that while both techniques improved functional mobility, MWM produced faster results in restoring abduction and external rotation (9). Conversely, another investigation found Spencer's technique to be more effective than METs in reducing pain and enhancing joint mobility in a three-week intervention for frozen shoulder, possibly due to its greater emphasis on passive end-range mobilizations (8,9). These comparative insights suggest that the choice of technique should be tailored to the stage of the disorder, patient tolerance, and rehabilitation goals.

**6. Limitations and Knowledge Gaps**

Despite promising findings, several methodological limitations are common across the current body of evidence. Many studies are constrained by small sample sizes, lack of blinding, and short-term follow-ups. Furthermore, heterogeneity in outcome measures—ranging from subjective pain scales to objective ROM measurements—complicates direct comparison across trials. Another limitation lies in the variable treatment dosages and techniques employed under the term "METs," underscoring the need for standardized protocols. Additionally, while METs and capsular stretching appear effective in improving physical function, limited data exists on their long-term sustainability or recurrence rates of symptoms after cessation of therapy.

**7. Clinical Integration and Future Directions**

The integration of METs and capsular stretching into routine musculoskeletal rehabilitation is supported by their low risk profile, patient comfort, and wide applicability across conditions. The current evidence base advocates for their use either as standalone therapies or in combination with other modalities such as PNF, neuromuscular re-education, or joint mobilization techniques. However, future research must focus on multi-center randomized controlled trials with larger sample sizes and standardized methodologies to solidify their place in evidence-based clinical practice. In addition, exploring the neurophysiological mechanisms underlying these techniques could further validate their therapeutic efficacy and guide precision-based rehabilitation planning.

**Table 1: METs vs Capsular Stretching**

| Intervention | Mechanism | Clinical Applications | Key Outcomes | Evidence Strength |
|---|---|---|---|---|
| Muscle Energy Techniques (METs) | Isometric muscle contractions for neuromuscular re-education and joint mobilization | Adhesive capsulitis, sacroiliac dysfunction, cervical and lumbar pain, post-stroke mobility | Improved ROM, reduced pain, muscle strengthening, adhesion breakdown, enhanced QOL | Consistently favorable across multiple studies |
| Capsular Stretching | Passive stretching to lengthen tight joint capsules and soft tissues | Adhesive capsulitis, shoulder stiffness, posterior capsule tightness, joint adhesion | Increased ROM, reduced capsular tightness, moderate pain relief | Effective but with less consistent superiority |

**Critical Analysis and Limitations**

The growing body of literature investigating the effects of Muscle Energy Techniques (METs) and capsular stretching in managing musculoskeletal dysfunction offers promising insights, yet it is not without significant methodological and interpretive limitations. A critical examination of existing studies reveals recurring challenges that compromise the strength of evidence and limit the translation of findings into broad clinical application. One of the most prominent limitations is the small sample size observed in many studies. Trials frequently involved fewer than 50 participants, which reduces the statistical power and increases the risk of type II error, limiting the ability to detect clinically meaningful differences. For instance, studies exploring the effectiveness of METs in adhesive capsulitis or sacroiliac dysfunction were often restricted to a narrow participant pool, making it difficult to extrapolate findings with confidence to the wider patient population (10). Additionally, the majority of these trials lacked rigorous randomized controlled designs, with many

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adopting quasi-experimental or pre-post interventional methodologies. This introduces concerns regarding the internal validity of the findings and increases susceptibility to bias.

Methodological biases further dilute the strength of available evidence. A notable issue is selection bias, particularly evident in trials that recruit participants from single rehabilitation centers, often excluding patients with co-morbidities or those in more advanced stages of musculoskeletal disease. Such homogeneous sampling limits the external validity and raises concerns about whether results can be applied to patients with more complex clinical profiles. Performance bias is also prevalent, with a lack of blinding for both therapists and participants being a common feature across trials (11). Given the subjective nature of pain and functional outcome reporting, the absence of blinding increases the likelihood of expectation-driven responses, thereby skewing results in favor of the intervention. Another limitation pertains to follow-up durations. Most studies reported short-term outcomes, typically within two to four weeks following the intervention, and seldom assessed the sustainability of improvements over longer periods. This shortfall is particularly critical in chronic musculoskeletal conditions, where relapse and regression of function are common. Long-term evaluations are essential to determine whether METs or capsular stretching offer enduring benefits or merely transient symptom relief (12). The dearth of longitudinal data restricts clinicians from making evidence-based decisions about maintenance therapies or the need for adjunctive interventions over time.

Furthermore, there is a notable lack of standardization in outcome measures used to evaluate the effectiveness of METs and capsular stretching. Some studies rely heavily on subjective tools like the Numeric Pain Rating Scale (NPRS) or patient-reported functional indices, while others incorporate objective measurements such as goniometry or dynamometry. The variability in assessment tools not only complicates inter-study comparisons but also undermines efforts to conduct meta-analyses or systematic reviews with consistent outcome criteria (13,14). Additionally, some studies fail to report effect sizes or confidence intervals, relying instead on p-values alone, which can be misleading and insufficient for assessing clinical significance. Publication bias also cannot be overlooked. Positive results demonstrating statistically significant improvements with METs or capsular stretching are more frequently published, while studies with null or inconclusive findings are underrepresented. This selective reporting distorts the perceived efficacy of these interventions and may encourage overreliance on techniques that are still undergoing empirical validation. The absence of high-quality registry data or unpublished trial repositories further exacerbates this issue and highlights a gap in comprehensive reporting standards within manual therapy research (15,16).

The generalizability of the current evidence is also a key concern. Most studies focus on specific demographic groups—often middle-aged adults or younger athletic populations—and exclude elderly individuals, pediatric patients, or those with systemic diseases like diabetes or inflammatory arthritis. As such, it remains unclear whether the observed benefits of METs and capsular stretching can be replicated in more diverse and medically complex populations. Moreover, the variation in practitioner experience and technique execution across studies introduces another layer of inconsistency that may affect treatment outcomes, particularly in real-world clinical settings where standardization is more difficult to enforce (17,18). In light of these limitations, future research should prioritize multicenter randomized controlled trials with adequate sample sizes, standardized protocols, and clearly defined outcome measures. Longer follow-up durations and better blinding methodologies would also strengthen the validity of conclusions. Addressing these gaps is crucial for establishing robust clinical guidelines and optimizing the integration of METs and capsular stretching into multidisciplinary rehabilitation programs.

**Implications and Future Directions**

The synthesis of current evidence on Muscle Energy Techniques (METs) and capsular stretching reveals promising implications for musculoskeletal rehabilitation and underscores their potential integration into contemporary clinical practice. The demonstrated benefits of METs in improving joint mobility, reducing musculoskeletal pain, and enhancing functional outcomes provide clinicians with low-risk, non-invasive tools that can be tailored to individual patient needs. Given the rising incidence of chronic musculoskeletal conditions in aging populations and physically inactive individuals, these manual techniques offer a conservative yet effective approach to managing joint dysfunctions without reliance on pharmacological interventions. Specifically, METs can be incorporated into early rehabilitation phases to restore mobility while minimizing pain, as seen in adhesive capsulitis, sacroiliac dysfunction, and postural neck syndromes, thereby accelerating return to function and reducing patient dependency on long-term medications or surgical options (19,20). From a policy and healthcare guideline perspective, the findings highlight the need for standardized clinical protocols that incorporate METs and capsular stretching as part of evidence-informed physiotherapy interventions. Current rehabilitation guidelines often emphasize generalized stretching and strengthening approaches without sufficient specificity regarding manual therapy applications. Recognizing METs and capsular stretching within national and international clinical practice frameworks—particularly in orthopedic and neurorehabilitation pathways—could enhance consistency in care delivery and optimize patient outcomes. Formal

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inclusion of these techniques in musculoskeletal management guidelines would also support their wider adoption across diverse healthcare settings, including primary care and community-based physiotherapy programs (21-24).

Despite encouraging outcomes, several questions remain unanswered, necessitating further exploration. Most notably, the long-term efficacy and sustainability of improvements associated with METs and capsular stretching have not been well established. While short-term benefits are well documented, longitudinal studies assessing the recurrence of symptoms, functional retention, and impact on quality of life are conspicuously lacking. Moreover, the precise physiological mechanisms by which METs influence muscle tone and joint biomechanics remain only partially understood. Future investigations could benefit from incorporating neurophysiological assessments such as electromyography (EMG) or ultrasound elastography to explore tissue-level changes following these interventions. Another gap in the literature involves patient-specific variables—such as age, gender, comorbidities, and baseline physical activity—which may influence responsiveness to these therapies and have yet to be adequately stratified in existing studies (25-27). To advance the field and ensure the reliable translation of findings into clinical practice, future research must embrace more robust methodological designs. Multicenter randomized controlled trials with larger sample sizes and longer follow-up durations are essential to establish definitive evidence of clinical efficacy. Blinding of both assessors and participants, standardized intervention protocols, and the use of validated outcome measures will enhance the internal and external validity of future trials. Comparative effectiveness research examining METs alongside or in combination with other manual therapy techniques such as joint mobilizations, proprioceptive neuromuscular facilitation, or dry needling would further elucidate their relative benefits in varied clinical contexts. Additionally, cost-effectiveness analyses could offer valuable insights into the economic implications of incorporating these techniques into standard rehabilitation regimens, an increasingly important consideration for healthcare policy-makers managing resource-constrained environments (28,29). Overall, this review not only consolidates the therapeutic relevance of METs and capsular stretching in musculoskeletal rehabilitation but also calls attention to the necessity of high-quality research to fully integrate these techniques into evidence-based practice. By addressing existing gaps through methodologically rigorous and clinically meaningful studies, the rehabilitation field can move toward more precise, patient-centered, and functionally effective care pathways for individuals with musculoskeletal impairments.

## CONCLUSION

The present review highlights that both Muscle Energy Techniques (METs) and capsular stretching are effective manual therapy interventions for enhancing joint mobility, reducing pain, and restoring functional capacity in individuals with various musculoskeletal disorders. However, among the two, METs consistently demonstrated superior outcomes, particularly in improving range of motion, reducing muscle tightness, facilitating postural corrections, and promoting overall quality of life. The current body of evidence, although promising, is primarily based on small-scale trials with methodological limitations, warranting cautious interpretation. Nonetheless, the cumulative findings suggest that METs offer a clinically valuable, non-invasive option that can be readily incorporated into rehabilitation protocols. For clinicians, these techniques provide a patient-centered approach to address mechanical dysfunctions without the risks associated with pharmacologic or surgical interventions. It is recommended that future research focus on large-scale, multicenter randomized controlled trials with standardized protocols and long-term follow-up to better define the efficacy, sustainability, and broader applicability of these interventions across diverse patient populations.

**Author Contribution**

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| Nyla Ajaz* | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Aiman Amjad | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |
| Esha Zafar | Substantial Contribution to acquisition and interpretation of Data |

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| Asma Imdad | Contributed to study concept and Data collection<br>Has given Final Approval of the version to be published |
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