



ORIGINAL RESEARCH PAPER

Physiotherapy

COMPARATIVE EFFECT OF MUSCLE ENERGY TECHNIQUE VERSUS KALTENBORN TECHNIQUE IN ADHESIVE CAPSULITIS PATIENT: A PILOT STUDY

KEY WORDS: Adhesive Capsulitis, Muscle Energy Technique, Kaltenborn Mobilization, Shoulder Pain, Joint Mobility.

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ABSTRACT **Background:** Adhesive capsulitis, commonly known as frozen shoulder, is a musculoskeletal condition characterized by pain, restricted shoulder mobility, and functional limitations. Manual therapy techniques, including Muscle Energy Technique (MET) and Kaltenborn Mobilization, are widely employed to enhance joint mobility and reduce pain. However, evidence comparing their clinical effectiveness remains limited. **Purpose:** This study aims to compare the effectiveness of Muscle Energy Technique versus Kaltenborn Mobilization Technique in improving shoulder pain and mobility among patients diagnosed with adhesive capsulitis. **Result:** Both treatment groups exhibited significant improvement in pain reduction and shoulder range of motion post-intervention. However, the MET group showed a slightly greater improvement in active range of motion, while the Kaltenborn group displayed a quicker reduction in pain scores.

INTRODUCTION

Adhesive capsulitis, commonly referred to as "frozen shoulder," is a chronic and often self-limiting musculoskeletal disorder characterized by progressive pain, joint stiffness, and significant restriction of active and passive shoulder movements. The condition typically evolves through three overlapping stages: the "freezing" phase marked by increasing pain and motion loss, the "frozen" phase where stiffness dominates with diminished pain, and the "thawing" phase in which gradual spontaneous recovery of range of motion (ROM) occurs (Hand et al., 2008; Challoumas et al., 2020).

Epidemiological studies suggest that adhesive capsulitis affects approximately 2–5% of the general population, with a higher prevalence observed in females and individuals aged between 40 and 60 years (Zuckerman & Rokito, 2011; Hand et al., 2008). The incidence is also notably higher among individuals with systemic comorbidities such as diabetes mellitus, thyroid dysfunction, cardiovascular disease, and autoimmune disorders (Wong et al., 2017). Diabetic patients, in particular, demonstrate a higher risk for bilateral and more resistant forms of adhesive capsulitis, which often respond poorly to conventional interventions (Kelley et al., 2013).

The pathophysiology of adhesive capsulitis is complex and not fully understood but is believed to involve synovial inflammation followed by fibrosis of the joint capsule, leading to capsular contracture and loss of joint mobility (Neviasser & Neviasser, 1987). Recent imaging and histological studies support this view, revealing inflammatory changes in the synovium and thickening of the coracohumeral ligament, which significantly restricts external rotation and abduction movements (Chen et al., 2020).

Conservative management remains the cornerstone of treatment, with physiotherapy playing a primary role in pain reduction, mobility restoration, and functional improvement (Page et al., 2014). Among the various physiotherapeutic techniques, manual therapy has shown promising results, particularly for joint mobilization and soft tissue extensibility. Techniques such as Muscle Energy Technique (MET) and Kaltenborn Mobilization are widely employed by clinicians to manage the mechanical dysfunction associated with adhesive capsulitis (Sharma et al., 2016; Vermeulen et al., 2006).

The Muscle Energy Technique (MET) is an active manual therapy technique that uses a patient's own muscle

contractions against a practitioner-applied counterforce to lengthen shortened muscles, mobilize restricted joints, and improve circulation (Chaitow, 2013). MET is believed to work via post-isometric relaxation and reciprocal inhibition mechanisms, reducing muscle hypertonicity and improving joint motion.

On the other hand, Kaltenborn Mobilization Technique is a passive joint mobilization approach that uses graded, sustained gliding movements based on the convex-concave rule to stretch the joint capsule and improve arthrokinematics. This method, developed by Freddy Kaltenborn, specifically targets the translational joint play movements that are often restricted in adhesive capsulitis (Kaltenborn, 2003).

While both MET and Kaltenborn mobilization are established components of physiotherapy for adhesive capsulitis, the evidence on their comparative efficacy is still evolving. Sharma et al. (2016) suggested that MET can significantly improve shoulder range of motion and reduce pain, while Vermeulen et al. (2006) demonstrated that mobilization techniques including Kaltenborn's can enhance functional outcomes in patients with frozen shoulder. However, a recent systematic review by Challoumas et al. (2020) emphasized the lack of high-quality comparative studies and highlighted the need for further research to validate the superiority or synergistic potential of these interventions.

Given the persistent clinical uncertainty and the growing burden of adhesive capsulitis on individuals' quality of life and productivity, this study aims to compare the effectiveness of Muscle Energy Technique versus Kaltenborn Mobilization in reducing pain and improving shoulder mobility in patients diagnosed with adhesive capsulitis.

Materials And Methodology
Objective Of The Study

To compare the effectiveness of Muscle Energy Technique and Kaltenborn Mobilization in reducing pain and improving shoulder mobility in adhesive capsulitis patients.

Study Design

A randomized controlled trial.

Sampling Method

Purposive sampling followed by random allocation into two groups.

Duration Of Study

The study was conducted over 8 weeks, with follow-ups at the 4th and 8th weeks.

Inclusion Criteria

- Patients aged 40–65 years.
- Clinically diagnosed with adhesive capsulitis (Stage II – Frozen Stage).
- Limitation in active and passive shoulder joint ROM.
- Pain duration >3 months.

Exclusion Criteria

- Recent fractures around the shoulder joint.
- Post-surgical shoulder conditions.
- Systemic inflammatory diseases (e.g., Rheumatoid Arthritis).
- Neurological deficits affecting upper limbs.

Tools Used In The Study

- Visual Analogue Scale (VAS) for pain.
- Goniometer for measuring shoulder joint range of motion.
- Shoulder Pain and Disability Index (SPADI).

METHOD

Participants Were Divided Into Two Groups:

Group A (n=15): Received Muscle Energy Technique (Post-isometric Relaxation and Reciprocal Inhibition) combined with conventional physiotherapy (hot packs, stretching, pendulum exercises).

Group B (n=15): Received Kaltenborn Mobilization Grades I-III targeting the glenohumeral joint, along with conventional physiotherapy.

Sessions were held 3 times per week for 8 weeks. Pain and mobility were assessed at baseline, 4 weeks, and 8 weeks.

RESULTS

Both groups showed statistically significant improvement in VAS and ROM from baseline to 8 weeks. Group A demonstrated a greater increase in shoulder flexion and abduction range, while Group B showed more rapid reduction in pain within the first 4 weeks.

Data Analysis

Outcome Measure	Group A: MET (Mean ± SD) Pre	Group A: MET (Mean ± SD) Post	Group B: Kaltenborn (Mean ± SD) Pre	Group B: Kaltenborn (Mean ± SD) Post	p-Value (Between Groups)
VAS Score (Pain)	7.8 ± 1.1	3.1 ± 1.0	7.6 ± 1.3	4.2 ± 1.2	0.03
ROM (Abduction °)	85.3 ± 10.5	140.4 ± 12.2	86.0 ± 11.2	132.5 ± 14.1	0.04
SPADI Score (Total)	71.5 ± 8.2	35.6 ± 6.4	70.9 ± 9.1	39.8 ± 7.2	0.05

- Both **MET** and **Kaltenborn** techniques significantly reduced pain and improved mobility.
- **MET** was slightly more effective in improving **functional mobility** (SPADI) and **abduction ROM**.
- **Kaltenborn** showed a faster early-stage drop in **pain scores** within the first four weeks.

DISCUSSION

The present study evaluated the comparative effects of MET and Kaltenborn mobilization on adhesive capsulitis, focusing on pain reduction and range of motion enhancement. MET utilizes post-isometric relaxation to improve soft tissue extensibility, while Kaltenborn Mobilization employs sustained joint gliding to stretch the capsule and reduce restrictions (Chaitow, 2013; Kaltenborn, 2003).

Our findings are consistent with those of Vermeulen et al. (2006), who reported the efficacy of joint mobilization in improving mobility in frozen shoulder. Similarly, Sharma et al. (2016) observed that MET could significantly improve shoulder function and decrease pain in adhesive capsulitis patients.

Interestingly, the Kaltenborn group in our study showed quicker short-term pain relief, which may be attributed to its effect on joint mechanoreceptors, altering nociceptive input (Vicenzino et al., 1996). In contrast, MET provided a more gradual but comprehensive improvement in range of motion, supporting the theory that active patient participation during MET leads to neuromuscular adaptation (Chaitow, 2013).

This suggests that while both techniques are effective, MET may have an edge in long-term functional recovery, whereas Kaltenborn may offer faster short-term symptomatic relief.

CONCLUSION

Both Muscle Energy Technique and Kaltenborn Mobilization are effective in the management of adhesive capsulitis for reducing pain and improving shoulder mobility. Muscle Energy Technique appears more effective in enhancing range of motion, while Kaltenborn Mobilization offers quicker pain reduction. A combined approach may offer the most balanced rehabilitation outcome.

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