Research article

COMPARING MUSCLE ENERGY TECHNIQUE (MET) VERSUS CONVENTIONAL PHYSIOTHERAPY IN CASES OF ADHESIVE CAPSULITIS OF SHOULDER- A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT
This study was a randomized controlled trial conducted at Noor Hospital Rawalpindi, Pakistan to compare muscle energy technique (MET) and conventional physiotherapy techniques in patients with confirmed diagnosis of adhesive capsulitis. This study was, conducted between March 2021 to August 2021. A total of 30 participants regardless of gender, aged between 30 to 60 years, with confirmed diagnosis of idiopathic adhesive capsulitis were included. Participants with unstable shoulder fractures and dislocation, thoracic outlet syndrome, rotator cuff injuries, reflex sympathetic syndrome, rheumatoid arthritis, extreme shoulder pain not relieved by any medication or rest were excluded from study. The patients were assigned in experimental (n=15) and control group (n=15) using sealed envelope method. Participants in both groups were assessed at baseline and after 4 weeks. The outcome of the treatment was measured in terms of numeric pain rating scale (NPRS), Shoulder Pain & Disability Index (SPADI) and goniometer for measuring shoulder ROM. The overall mean age of participants was 51.64±5.31 years. The study included 12 (40%) males and 18 (60%) females. After 4 weeks of treatment a significant difference (p-value <0.05) was seen between groups in terms of pain, disability and shoulder ROM. The study concluded that MET is a non-invasive treatment for reducing pain. The MET was also shown to improve functional ability and ROM in patients with adhesive capsulitis in comparison to conventional physical therapy treatment.

Key Words: Adhesive capsulitis, Pain, Range of Motion, Frozen shoulder

INTRODUCTION

Adhesive capsulitis, commonly known as frozen shoulder is a common orthopedic practice complaint, with frequent referral for Physiotherapy. It presents with pain, and progressive reduction in shoulder range of motion, causing significant disability (1). Codman described the term 'frozen shoulder' for the first time in 1934, as a painful condition with progressive loss of mobility and pain when lying on effected side which is a key sign (2). There is no known cause of adhesive capsulitis but the radiographic findings of calcific tendonitis or osteopenia along with fibrosis and contracture of joint capsule are observed in patients (3). It commonly affects females of age between 40 to 60 years. Globally the rate of adhesive capsulitis is reported to be 2-5 % in general, however, the rate in diabetic patients is reported to be higher with a prevalence rate of 10-15% (4, 5). The two significant modifiable risk factors associated with frozen shoulder are diabetes and obesity (6). Adhesive capsulitis is categorized into three progressive patterns: freezing phase (severe diffuse pain), frozen phase (loss of ROM with reduction in pain) and thawing (recovery and gradual return of ROM). Primary adhesive capsulitis is idiopathic, while secondary adhesive capsulitis develops after any pathology like rotator cuff injury, diabetes and stroke (7).

Conservative management for frozen shoulder to relief pain and inflammation include NSAID, steroids given orally or intra-articular (8). Various physical therapy interventions are also used for pain management and to restore function which includes cold and hot packs, active and passive ROM exercises, Codman's exercises, mobilization, stretching and strengthening exercises, TENS, ultrasound and interferential therapy

(9). Muscle energy technique (MET) is a non-invasive technique, introduced by Fred Mitchell, for the first time in 1948. The MET helps to stretch a muscle in a unique way, that patient initiates the movement while therapist facilitates the movement (10). The MET is combination of two muscular phenomena including Post Isometric Relaxation (PIR) and Reciprocal Inhibition (RI) (11). The PIR technique was introduced by Karel LeWitt et al in which submaximal isometric contraction of a stretched muscle is performed followed by relaxation and slight stretching of relaxed muscle (12). This technique uses the principle of autogenic inhibition (12). There are a number of different physiotherapy interventions being used to treat adhesive capsulitis. However, there is limited literature available on effects of muscle energy technique in this regard. Therefore, this study was designed to compare the effectiveness of MET with conventional physiotherapy techniques for adhesive capsulitis.

METHODOLOGY

This study was a randomized control trial, conducted at Noor hospital Rawalpindi between March 2021 to August 2021. The study protocol was approved from the ethics review committee of Ibadat International University, Islamabad, Pakistan. Sample size was calculated using online open epi tool. Those who fulfilled inclusion criteria were invited to participate in the study and a detailed treatment protocol was explained to the participants along with the risks and benefits. Those who agreed informed consent was taken. Both male and female gender of age 30 to 60 years, diagnosed with idiopathic adhesive capsulitis were included in this study. Participants with unstable shoulder fractures and dislocation, thoracic outlet syndrome, rotator cuff injuries, reflex sympathetic syndrome, rheumatoid arthritis, extreme shoulder pain not relieved by any medication or rest were excluded from study.

Those patients who agreed were randomized into two groups: experimental group and control group with 15 patients in each group, using sealed envelope method for randomization. Participants in experimental group received MET and conventional Physical therapy while the control group only received conventional physical therapy. The conventional physical therapy included hot pack for 5-8 minutes, passive stretching of muscles, manual therapy glides. The MET for shoulder abduction, flexion, extension, internal rotation and external rotation was done. Therapist provided resistance for 3-5 seconds and participants were asked to use muscle energy against resistance applied by therapist. Participants were then asked to relax for 3 seconds take up the slack and then repeat. MET were given for 6 reps per set and three sets in each session. The conventional physiotherapy for control group included hot pack 7-8 min, passive stretching of pectoralis major, pectoral minor, trapezius, serratus anterior for 20 second with 10 second rest with a repetition of five times in each session. Conventional manual therapy shoulder glides (anterior, posterior, inferior) were given as three sets of 10 reps in each session. The treatment was given to both groups as three sessions per week on alternate days for four weeks (a total of 12 sessions). Participants in both groups were assessed at baseline and after 4 weeks by an experienced physiotherapist. Figure 1 presents summary of study protocol.

The outcome measures used for this study were numeric pain rating scale (NPRS), Shoulder Pain & Disability Index (SPADI) and goniometer for measuring ROM.

Statistical analysis:

Statistical Package for Social Sciences (IBM SPSS, version 24) was used for data collection and analysis. For continuous variables normality test (i.e. Shapiro-Wilk) was applied. Given the normal distribution of the data all parametric tests were applied to compare two groups. The difference of two groups was considered significant if the p-value was <0.05 .

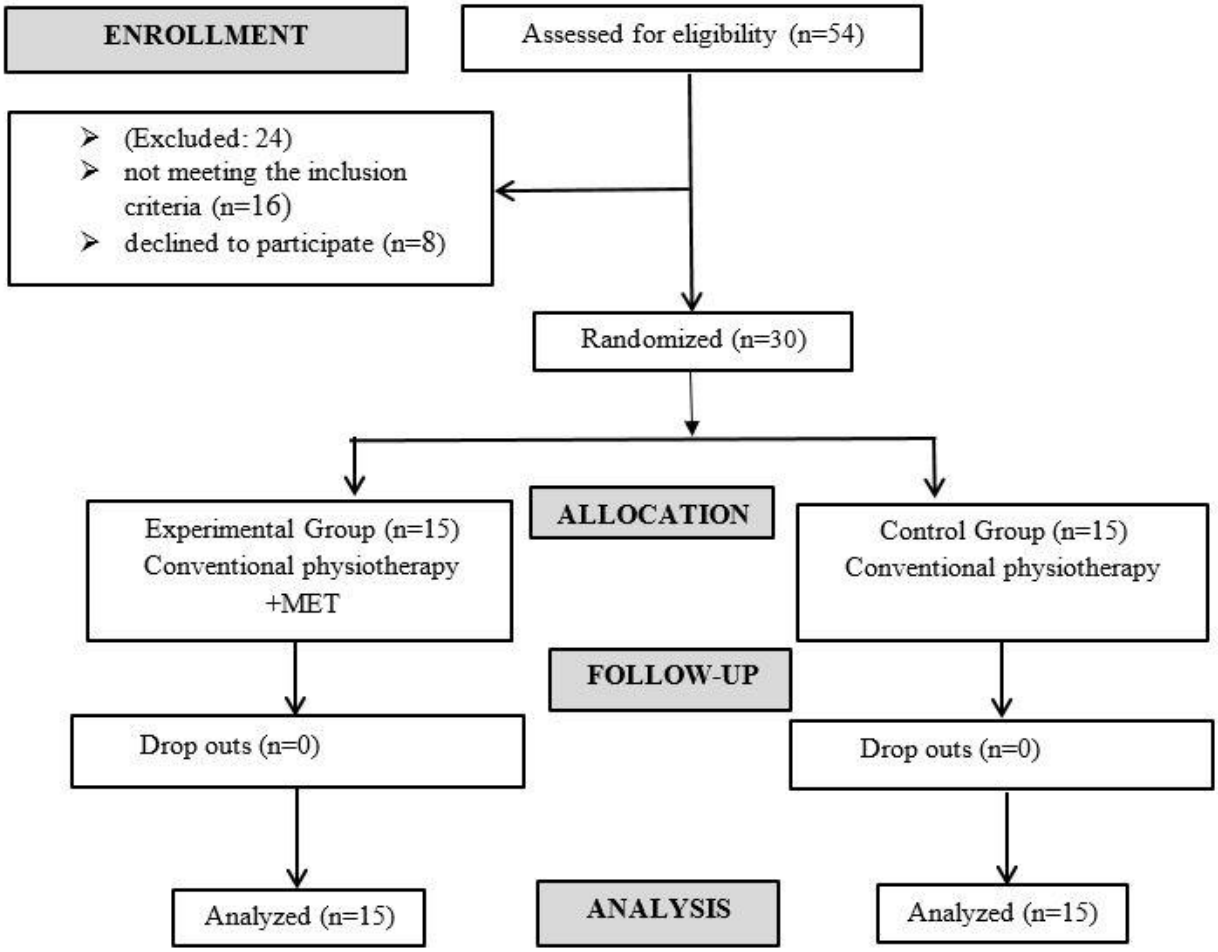

Figure 1: Consolidated Standards for Reporting of Trials (CONSORT) diagram.

RESULTS

Of the 54 participants assessed for eligibility, 24 (44.4%) were excluded and 30 (55.6%) were included in the study trial. There were 15 (50%) participants in each of the two groups (as shown in Figure 1).

The overall mean age of participants was 51.64±5.31 years. The mean age for experimental and control group was 51.13±7.21 years and 53.49±5.23 years respectively. The study included 12 (40%) males and 18 (60%) females. Majority of study participants 53.9% reported right shoulder affected and 46.1% with left shoulder affected.

At baseline all parameters including NPRS, SPDI and shoulder ROM were same in both groups (p-value >0.05). However, after 4 weeks of treatment significant difference (p-value <0.05) was seen between groups in terms of pain, disability and shoulder ROM. A summary of results is given in Table 1 and table 2.

DISCUSSION

The purpose of the current study was to evaluate the effects of muscle energy technique on shoulder pain, disability and ROM in cases of adhesive capsulitis. The study showed that pain, disability and range of motion improved in both groups respectively. However, if we compare both groups then significant improvements were seen in patients who received MET. The main symptoms of adhesive capsulitis are pain and decrease in range of motion which results in difficulty performing ADLs.

Table 1: Inter-group comparison of shoulder pain and disability

Variables	Groups	At baseline Mean ± SD	P value	After 4weeks Mean ± SD	P value
NPRS	Experi-mental	7.13±2.14	0.28	2.28±1.43	0.04
	Control	7.41±4.68		4.39±1.57	
SPADI	Experi-mental	64.30±7.18	0.073	28.69±6.31	0.001
	Control	69.57±5.46		40.35±9.04	

Table 2: Inter-group comparison of shoulder range of motion (ROM)

Shoulder ROM	Groups	At baseline Mean ± SD	P value	After 4weeks Mean ± SD	P value
Flexion	Experimental	100.05±6.24	0.458	162.36±14.35	0.001
	Control	103.40±11.25		134.43±11.61	
Extension	Experimental	39.16±7.13	0.538	48.34±8.26	0.002
	Control	30.65±9.31		36.56±7.11	
Abduction	Experimental	55.73±10.60	0.341	93.37±11.48	0.001
	Control	54.89±13.87		75.34±6.13	
Internal Rotation	Experimental	43.51±6.47	0.312	69.64±10.36	0.001
	Control	40.46±9.33		51.49±13.64	
External Rotation	Experimental	38.37±6.48	0.044	66.54±5.08	0.001
	Control	34.13±7.36		49.71±13.15	

Literature supports the fact that Muscle energy technique improves extensibility of muscle and relaxing the affected muscles by crossing the restriction barriers. Moreover, MET helps in reducing stiffness, pain and provides greater functional gains. Viscoelastic properties and neural factors result in increased range of motion following muscle energy technique (13).

Narayana et al conducted a similar study in 2014 and found that group which was treated with MET showed better results considering scores of SPADI in comparison with group which was treated with conventional physical therapy. They reported that MET was very effective in patients with adhesive capsulitis for improving function of shoulder joint (14). Studies showed that improvement in pain and functional ability is a result of post isometric relaxation caused by application of MET. It is observed that exercises performed within pain free range causes stimulation of mechanoreceptors that modulates pain by activation circulatory pain biomarkers (11). Suri et al conducted a comparative study for effective treatment of shoulder adhesive capsulitis. They found MET to be more effective in comparison with Maitland technique for reducing pain, incorporating mobility and for improving range of motion of shoulder joint (15). Moore et al studied the immediate effects of MET, they concluded that significant improvement was seen in range of motion of shoulder joint after treating with muscle energy technique (16). In another randomized control study, it seemed that muscle energy technique was more beneficial than mobilization in terms of pain and shoulder functions for patient with adhesive capsulitis (17). The sample size was small so study results cannot be generalized. Moreover, it was a short duration study and no long follow ups were taken are considered as limitations of the study. Thus large scale long term follow-up studies are recommended.

CONCLUSION

The study concluded that MET is a non-invasive effective treatment for reducing pain, improving functional ability and ROM in patients presenting with adhesive capsulitis in comparison to conventional physical therapy treatment.

Ethical Consideration: The study was approved by the local Research Ethics Committee
Conflict of Interest: There is no conflict of interest.
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