



ADDED EFFECTS OF SPIRAL STRETCH MUSCLE ENERGY TECHNIQUE(MET) ON PAIN, RANGE OF MOTION(ROM) AND FUNCTION IN ADHESIVE CAPSULITIS.

Physiotherapy

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ABSTRACT

Background: Adhesive Capsulitis (AC) is common condition causing pain and marked functional disability in shoulder joint. Research reports Muscle energy Technique (MET) improves flexibility and reduces pain. Spiral Stretch MET which is another variant of MET applied on accounts of Proprioceptive Neuromuscular Facilitation (PNF) principles, a protocol that can demonstrate evidence to improve pain, flexibility and function is needed in patients with AC.

Objective: The objective of this study was to assess the added effects of Spiral Stretch MET with conventional treatment to improve pain, range of motion and function in patients with AC in two weeks protocol.

Methods: 30 subjects pre-diagnosed with AC were randomly allocated into groups of (Group A) MET with adjunct to conventional treatment and (Group B) conventional alone for two weeks. Primary outcome was Numerical rating scale for pain, Range of motion and Shoulder pain and disability index SPADI for function. Outcomes were assessed at baseline and at two weeks.

Results and Conclusion: The intervention improved pain, range of motion and function post treatment, with the significant difference in experimental group Spiral Stretch MET treatment compared to the control group

KEYWORDS

Adhesive Capsulitis, Spiral Stretch MET, PNF, conventional treatment, NRS, SPADI

INTRODUCTION

Amongst different conditions affecting the shoulder complex Adhesive Capsulitis (AC) is a common condition causing pain and marked functional disability in shoulder joint with prevalence of 5% amongst the population¹, it usually affects between the age group of 40-60 years. The peak age being 56 and women being more affected than men according to studies². Nevasier coined the condition as he studied that there was tight thickened, inflamed capsule especially in the Axillary folds that was stuck to the humerus which led to ailments³.

He later described III stages of AC which are as follows:

Stage I – Freezing this stage is characterized by the onset of an aching in the shoulder with active and passive range of motion. The pain usually more severe at night and with activities, and may be associated with sense of discomfort that radiates down the arm

Stage II – Frozen the second stage is progressive stiffness phase, pain at rest usually diminishes during this stage, motion is restricted in all plane. ADL become severely restricted. Patient complain about inability to reach back pocket, fasten bra, comb the hair, or wash opposite shoulder. Pain common at night.

Stage III- Thawing this stage is characterized by a slow recovery of motion with no pain and no synovitis but significant capsular restriction from adhesions. There is slow and steady recovery of range of motions resulting from capsular remodelling.⁴

The condition has evidence of limitation in passive and active movements with substitute of scapular motions. Passive mobility is limited in capsular pattern i.e. External rotation most restricted followed by Abduction followed by Internal rotation respectively. Other common impairments encountered are night pain, disturbed sleep, faulty posture compensations, reduced muscle performance and endurance followed by atrophy of muscles. All of the above structural compensations encapsulates functional limitation and disabilities in our day to day life causing inability to reach overhead, behind the neck, behind the back etc. leading to difficulties in dressing, fastening undergarments, reaching for back pocket, self-grooming such as bathing, washing hair, combing etc¹ causing disabling functional restrictions. Hence physical therapists should address impairments and limitations associated with each of these contributors to the pathology of adhesive capsulitis with a variety of treatment methods^{5,6}. Levine and colleagues showed a 90 % success rate with non-operative treatment over an average of 4 month⁷. Unfortunately patients often

acknowledge some deficiencies in regaining range of motion even after 'successful' treatment. Many studies have concluded that traditional conventional rehabilitation protocol is effective for reducing pain and disability in patients with AC⁷. Muscle energy technique(MET) is one such proven intervention through various research⁵. Modified Proprioceptive Neuromuscular Facilitation(PNF) “SPIRAL STRETCH” Muscle Energy Technique (MET) methods have been incorporated into useful assessment and treatment sequences(McAtee & Charland 1999)^{8,9,10,11,12}. These methods have been modified to account of MET principle. Adhesive Capsulitis is associated with decreased joint mobility specifically in functional patterns of movement like reaching for something from high shelf shoulder flexion, adduction, external rotation) and reaching for back pocket (shoulder extension, abduction, internal rotation). Spiral stretch MET is a technique given in functional patterns and is relatively unexplored. Hence aim of the study is Added effect of spiral stretch muscle energy technique (MET) on pain, range of motion (ROM) and function in AC

MATERIAL AND METHODOLOGY

The study was approved by the MIMER medical college. ethical committee. Written informed consent was obtained from participants before entering the study. Shoulder pain patients who were pre-diagnosed of having AC by the consultant orthopedics were included in the study. A detailed explanation about the purpose and procedure of the study was given to all the patients before beginning the intervention. A total of 39 subjects both males and females were screened for the study out of them 30 patients were included in this study depending on their fulfillment of the inclusion criteria. The inclusion criteria were age of 40–60 years, Pre diagnosed AC shoulder patients, both gender diabetic, Non diabetic. The exclusion criteria were a history of subjects with Rotator cuff tears and other shoulder ligament injuries, recent associated fractures of upper limb, patients with muscular dystrophies, infection in the shoulder joint, cervical instability, psychiatric illness. Primary outcome measures of the study were then assessed at baseline and end of two weeks using Numerical Rating Scale (NRS) for pain intensity, Mobile Goniometer for Range of Motion and Shoulder Pain and Disability Index (SPADI) for Shoulder pain and function.

Randomisation and Concealed allocation: Patients included were blinded and randomly allocated in two groups with chit method Group A and Group B respectively. Patients in Group A were treated with SPIRAL STRETCH MET along with conventional treatment and patients in Group B were treated with conventional treatment only.

OUTCOME MEASURES

The Outcome were assessed at baseline, and at two weeks (post treatment) Primary outcome measures were as follows Pain¹³: The pain intensity was assessed using a Numerical Rating Scale. A 10 cm line was provided to the patient where 0, 5 and 10 were marked at the beginning, middle and at the end of the scale which indicated no pain, bearable pain and worst pain possible respectively. The patient was instructed accordingly about no pain, bearable and worst pain and was told to mark his pain intensity on it and recorded. Shoulder Mobility the second outcome measure range of motion of shoulder joint was assessed using Android based Goniometer¹⁴ (Goniometer Records App). Patients were explained about the procedure and were asked to stand/supine lying at zero degree of motion for abduction on lateral aspect of radial side and patients were asked to abduct in available range actively and phone was taken along with the limb and was recorded. Functional disability¹⁵ was assessed with SPADI and scale was explained to the patient. The scale consisted of 5 questions regarding pain and 8 questions regarding disability encountered in day to day activity. Baseline and post treatment score were compared. The patients were told to spot that statement which clearly describes patient's problem as of how his/her shoulder pain which affected his/her ability to manage everyday life. The interpretation of the scale was done after scoring.

TREATMENT PROCEDURE

Patients in Group A were treated with spiral stretch MET along with conventional treatment and patients in Group B were treated with conventional treatment alone. Patients in both the groups were given hydro collar packs before beginning the intervention followed by Interferential Therapy (IFT) for 15 mins respectively. Following was the exercise protocol given: Wand Exercises, Shoulder Isometrics, Finger Ladder, Shoulder Shrug, Retraction, Scapular setting exercise were done with 10 repetition of each and progression of repetition was done in both group patients after first week.

All the patients were given spiral stretch MET Five days a week completing 14 sessions. The first session involved teaching basic principle of MET (i.e. Post Isometric relaxation, difference in amount of therapist resistance and patients muscle contraction). Patients were made sure that their amount of muscle force should not exceed 25%. The protocol included attaining supine position and performing MET in Flexion pattern(D1) and Extension pattern(D1) with gradual post isometric relaxation technique, contraction of 5 sec followed by active assisted stretch for 30 secs for 3 times respectively^{11,12,22,23}.

STATISTICAL ANALYSIS

Statistical analysis using In Stat version 3 Demographic characteristics - the P value for demographic data of age and duration of symptoms between the two groups was found to be non-significant (>0.05) suggesting demographic data matching. Baseline parameters - the P value of baseline parameters for Pain, Range of Motion and SPADI score between the two groups was found to be non-significant (>0.05) suggesting that the baseline values for the outcome measures was matched.

We also used Paired sample T- test for within group analysis of pre and post values of NRS, ROM, SPADI among to two groups and Unpaired sample T- test for between group. A p value of <0.05 was considered as significant.

TABLE NO. 1

ROM, PAIN and SPADI score at post treatment between group analysis.

OUTCOME MEASURES	MET GROUP mean (SD)	CONTROL GROUP mean (SD)	p VALUE
ROM FLEX	42.86(11.22)	14(5.25)	0.001
ABD	38.2(12.67)	12.53(4.42)	0.001
IR	16.86(6.20)	7.866(2.13)	0.001
ER	17(8.72)	5.93(2.37)	0.001
PAIN	3.53(0.63)	4.2(1.014)	0.004
SPADI	43.8(9.33)	64.26(16.70)	0.003

Data are presented as mean (SD) p value ROM=range of motion FLEX=flexion; ABD=abduction; IR=internal rotation; ER=external rotation; SPADI=shoulder pain and disability index.

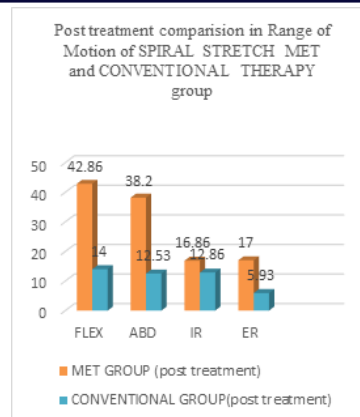


FIGURE 1

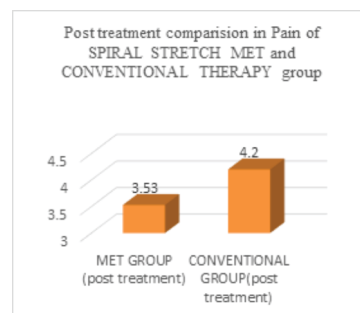


FIGURE 2

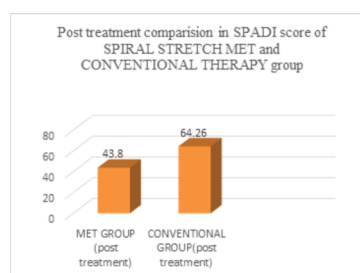


FIGURE 3

DISCUSSION

This experimental study was performed to evaluate the Added effect of Spiral Stretch MET on Pain, Range of motion and functional disability in shoulder pain patients with AC. For the purpose of this study a total of 39 patients were included from which 9 were dropouts as they couldn't fulfill the treatment period, hence 30 patients completed the study. They were assessed and divided into two groups by random chit method without replacement. 15 patients were given Spiral Stretch MET and other 15 were given conventional treatment for a period of 2 weeks. Most of the patients had shoulder pain with radiation to Upper Trapezius and Arm and some with confined shoulder joint pain. In the present study, we established the efficacy of each interventional program individually by Pre and Post treatment analysis with NRS, Android based Goniometer and SPADI. Statistically both groups attained successful outcomes however in inter group analysis Spiral stretch MET was found to be more significant. Spiral stretch MET was effective in reducing pain by 62% and functional disability by 28% in shoulder pain patients with AC. A study done by Lori A Michener¹⁶ suggested a minimum of 2.17- point change in the NRS average is clinically acceptable for improvement to be considered as the cut off point for minimal important change in pain. Similarly, in another study Roy JS, et al.¹⁷ suggested a minimum difference of 8 to 13 to be clinically significant detectable difference in disability score on SPADI. In our study difference of pain and SPADI score in MET group was 3.53 and 64 respectively which was more than minimal detectable change from above studies which was thus significant clinically proving the effectiveness of spiral stretch MET for pain and function. We also found significant improvement in ROM of flexion, abduction, internal rotation and external rotation. Thus, our documented results confirm the effectiveness of spiral stretch MET on

pain, ROM and disability in patients with AC. The present findings may be justified by explaining the role of spiral stretch MET on shoulder capsule. spiral stretch MET is an active stretching approach which represents revision of PNF McAtee & Charland⁹, and these methods have been altered to take account of MET principles Chaitow⁸. This approach used isometric contraction (reciprocal inhibition) of the muscles followed by active assisted stretch. Muscle relaxation following contraction is proposed to occur by activation of Golgi tendon organs and their inhibitory influence on the alpha-motor neuron pool, or due to reciprocal inhibition produced by contraction of a muscle antagonist Kuchera&Kuchera¹⁸ which must have helped to set the muscle to new length and thus improving Range of motion thus supporting our study. Also considering amount of force, greater degree of strength than 25%-30% of available force is used, causing recruitment of phasic muscle fibres rather than the postural fibres that usually shorten and require stretching¹⁹ thus it was appropriate in our study not to use force greater than 25% avoiding more tightness of postural muscles and associated stretching of the muscle since it is far more easier for practitioner as well as the patient to control light contraction and less likelihood to provoke pain, cramps, muscle damage and soreness, thus making MET more safer and gentler. Since AC is associated with decreased joint mobility specifically in functional patterns resembling PNF patterns of upper limb i.e. D1 flexion and extension pattern (*reaching for shelf above or back pocket*) SPIRAL STRETCH MET is performed in diagonal pattern (functional pattern) which resembles movements done by upper limb in ADL's. Patients in both the group were given hot fomentation prior to commencing the exercises. Superficial heating brings about an elevation in the temperature, increase in soft tissue flexibility, helps in increasing muscle resistance, brings about easier and better contraction of smooth muscles and also improves motor function of muscles causing inhibition of pain signals. Thus, causing pain reduction in both the subject population. Abhay Kumar et al²⁰, Effectiveness of Maitland Techniques in Idiopathic shoulder Adhesive Capsulitis. In his study he concluded that Maitland's mobilization mainly consists of rhythmic oscillatory movements which stimulate the type-2 dynamic mechanoreceptors and by this way can inhibit the type-4 nociceptive receptors. Maitland's rhythmic oscillations also has an effect on circulatory perfusion. The ongoing circulatory stasis may lead to ischemia and the potential for intraneural edema, inflammation, and fibrosis. Mobilization has an effect on fluid flow as blood flow in the vessels supplying the nerve fibres and synovial fluid flow surrounding the avascular articular cartilage, thus reducing pain^{21,22,23}. Hence this must have helped to increase shoulder Range of motion and associated reduction in pain intensity & function.

CONCLUSION AND CLINICAL SIGNIFICANCE

Spiral Stretch MET was clinically significantly when compared to conventional treatment alone. Thus, proving efficacy of addition of Spiral stretch technique to conventional treatment for reducing pain, increasing range of motion and improving functional status over a period of 2 weeks, in shoulder pain patients with Adhesive capsulitis.

SCOPE AND LIMITATIONS

Limitation

In this protocol only 2 weeks of supervised intervention was given. There is no term follow up for the treatment groups in order to keep a record of the results. Also effects of medications were not considered which could have altered the outcomes of our study. Occupational differences were not considered.

Scope

Long term effects of the treatment protocols can be assessed beyond 2 weeks.

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