

Impact Of Muscle Energy Technique Along With Capsular Stretch On Range Of Motion In Peri- Arthritis Shoulder –Case Series

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Abstract

Peri-arthritis is a debilitating condition of shoulder characterized by progressive pain, severe stiffness and movement restriction present in 4th- 6th decade of life. As per aetiology, it is associated with the interaction of constitutional and extrinsic factors among patients. Many different physiotherapy techniques such as manual mobilization, stretching, PNF, flexibility exercise, electro therapeutic modalities are employed to improve symptoms of frozen shoulder. Among them, Muscle Energy Techniques (MET) are direct manipulative procedures that use a voluntary contraction of the patient's muscles against a distinctly controlled counter-force from a precise position and in a specific direction. Therefore the objective of the study was to evaluate the effectiveness of MET along with capsular stretching in improving range of motion in peri arthritic shoulder. **Methodology:** In this case series a total five patients (3females and 2 males) clinically diagnosed with peri-arthritis shoulder with no history of trauma, heart disease, diabetes mellitus or any other musculoskeletal and neurosurgical involvement were considered. Pain intensity (NPRS), Range of motion (Goniometer) and functional disability(SPADI) were taken as outcome measures. Baseline assessment of outcome measures was done followed by intervention which was given for 3 weeks and included MET along with capsular stretching for three consecutive days followed by conventional physiotherapy for rest of three days per week for total three weeks. At the end of three weeks, post intervention assessment for the same was done and compared **Result:** There was comparatively significant improvement in pain intensity (mean difference 2.2 P<0.05).Range of motion was improved (mean difference 13.2 for flexion ,25.2 for Abduction ,15 for IR and 13.8 for ER and P<0.05) and this improvement finally results into significant improvement in shoulder disability index (mean difference 12.6

; $P < 0.05$) Which indicates improved quality of life. **Conclusion:** This study concludes that Reciprocal inhibition of MET improves the shoulder functions in patients with peri-arthritis when it is employed along with inferior and posterior capsular stretch. It brings better improvement in decreasing pain, improving range of motion and associated decline in the shoulder disability index. Therefore this given protocol has shown to improve quality of life in patients with peri-arthritis.

Introduction :

The shoulder joint is a complex joint composed of three different bones connected in an intricately designed fashion, making three distinct joints namely Sterno-clavicular joint, Acromio-clavicular joint and Glenohumeral joint, which when working together as a whole, allows movement in multiple planes and directions.[1] The articular structures of the shoulder complex work towards the generation of force during a dynamic action (dynamic force) and play a vital role in giving the joint its fundamental stability. The broad range of movements available at this joint makes it the most mobile joint and poses issues of instability and injury. The shoulder joint with its wide range of motion fulfills all the needs of activities of daily living like Grooming reaching for objects at a height and many more.[2] The important joint to look at among the articulations of shoulder girdle is the Glenohumeral joint(GHJ). The GHJ is formed when humeral head articulates with shallow glenoid cavity of the scapula. It is a ball-and socket type of synovial joint.[3] These two structures arrange in a manner to allow extensive movement of shoulder. This joint is covered and guarded by articular cartilage, which is present on around the head of humerus and is being thick at center than margins, whereas the reverse pattern is seen with articular cartilage at glenoid cavity.[4]

The Glenohumeral Joint is described to have three rotational degrees of freedom i.e flexion/extension, abduction/adduction and medial/lateral rotation. Flexion is about 180° and about 50° - 60° of extension. [5] The maximum abduction range of motion at shoulder joint is the topic of much disagreement. However it is said to be about 160° - 180° . The range of rotational movements of the humerus varies with position. When the arm is at the side, the rotational movement may be limited to as little as 60° of combined motion,[6] when abducted to 90° at shoulder joint the medial rotation is reported to be 70° and lateral rotation is measured to be 90° . Due to the extensive mobility, the shoulder joint is more prone to injury. The injuries or conditions associated with shoulder include sprains, strains, dislocations,

separations, rotator cuff tears, peri-arthritis, fractures and arthritis. [7] Approximately 20% of the people suffer from pain in shoulder due to intrinsic or extrinsic origin accompanied by disability. [8]

Peri-arthritis of shoulder is a clinical diagnosis achieved from a history of the gradual onset of severe pain and limitation of active and passive movements at GHJ. [9] It is a condition of shoulder with an unknown cause. The clinical symptoms that appear are pain with limited range of motion, alteration in scapulohumeral rhythm and disuse atrophy of muscles around shoulder joint.[10]

Peri-arthritic shoulder is characterized by impetuous onset of pain and discomfort in the shoulder with restriction in movement in each direction around the joint. The onset is found to be insidious and the symptoms progress by relative inactivity of shoulder in inactive individuals. The areas of pain perception are the anterolateral aspect of the joint, this pain may even radiate to the anterior aspect of the upper arm. Patients complain of discomfort which is worse at night and are mostly sleep deprived. When examining a patient tenderness may be reported about the humeral head and the bicipital groove. Restriction is perceived in general active and passive range whereas the pain is felt at the extreme of the motion.[11]

Three stages of frozen shoulder have been described like first stage being a painful stage, second stage is a stage of stiffness or “frozen” whereas the last stage is the stage of recovery or “thawing” stage, with the average length of symptoms lasting 30 months.[12]. Adhesive capsulitis is thought to be reversible in the acute pain stage and thus treating peri-arthritis in this stage brings better outcomes[13]

There is prevalence of both unilateral (non-dominant arm) and bilateral involvement. 2-5% of the general population is affected by the condition whereas in diabetics the incidence is between 10- 20%. [12] 70% cases which have been reported involve women however men with peri-arthritic shoulder take long time for recovery with risk of more disability.[13] Age and gender distribution found in the literature are usually variable where ages are ranging from 40 years to 70 years and percentage of female subjects are ranging from 48% to 84%. [16]

The exact cause of peri-arthritic shoulder has not been proved yet, postulated ideas of the cause include trauma to shoulder joint, and other associating factors including gender with females being more prone, age above 40, trauma, prolonged immobilization, diabetes,

disorders associated with thyroid, stroke, cardiac disorders and autoimmune diseases etc.[14] A very limited data is available over the statement that Peri-arthritis of shoulder is a self-limiting disease and the time period varies from 1 to 3years.[13] Most authorities agree that its cause is joint capsulitis and synovitis resulting eventually into the formation of capsular adhesions. Peri-arthritic shoulder is a common condition that chiefly affects the working population. This clinical condition is of concern because of its frequent occurrence, limiting working capacity, frequent resistance to treatment and progression at all times to a capsulitis resulting in prolonged severe disability before resolution occurs.[15] In adhesive capsulitis, the capsular ligament around the joint gets shortened and fibrosed. Nevasier was the first person to report thickening and contraction of the shoulder capsule as well as inflammatory changes through histological analysis. [17]

Diagnosis of frozen shoulder is based upon the presence of the characteristic features of the pain and selective limitation of passive external rotation. To differentially diagnose Peri-arthritis shoulder from other shoulder anomalies like Ac arthropathy and GH Osteoarthritis can be differentiated by conventional radiography where as autoimmune disease such as SLE, RA and Neoplasia etc need MRI. The patient can be advised to undergo and ultrasound examination to rule out the possibilities of dislocation, osteoarthritis or rotator cuff tear.[16] On observation of patient's posture, scapular winging maybe seen from posterior and /or lateral views of the involved shoulder.[2] Special tests also greatly help to diagnose peri-arthritis shoulder like Hand to same Scapula and Hand to opposite Scapula test etc. [21]

Advocated treatment options include anesthesia, corticosteroid injections, acupuncture, physical therapy, and arthroscopic or open surgery. Treatment of Peri-arthritis shoulder is mainly concerned with correction of capsular tightness, inflammation and pain reduction. The main domain attending to these issues are Physiotherapy and medicine (anti-inflammatory approach).[22] Focusing on physiotherapy, multiple treatment options are available such as stretching exercises, strengthening exercises and flexibility exercises, modalities for pain relief and various mobilization techniques suited as per the stage of the conditions. Among all these available physiotherapy treatments the approach that significantly improves ROM in shoulders with Peri-arthritis is Muscle Energy Technique.

Fred L. Mitchell has developed the muscle energy technique (MET). It is defined as resistive reduction, in which series of muscle contraction against resistance are used. MET requires the patient to generate a force by activating the targeted musculo-tendinous unit against a specifically aimed counterforce applied by therapist.[19] MET is applied manually and it aims at the soft tissue structures mainly, play a role towards mobilization of involved joint. This approach can be termed as active muscular relaxation technique. It is beneficial for a variety

of purposes such as to lengthen a shortened muscles, act as a lymphatic or venous pump to increase the drainage of fluids or blood and to increase the joint range of motion. [23]Muscle energy technique uses isometric or isotonic contraction as a way of lengthening tight muscular structures, strengthening weak muscles, mobilizing joints and relieves congestion in the tissue. The two forms of MET are Post-Isometric Relaxation(PIR) and Reciprocal Inhibition(RI). Stretching is defined as a Therapeutic maneuver which increases the extensibility of restricted soft tissues. One of the most used type of stretch in Peri-arthritis is Capsular Stretch. Types of Capsular Stretch - Anterior, Posterior, Inferior .[24] Aim of the study was to analyze the effect of MTE along with capsular stretch for increasing ROM in patients with peri-arthritis shoulder.

Methodology: The study was conducted in the department of Physiotherapy ,Lovely Professional University ,Punjab. A total of 5 patients with clinically diagnosed peri-arthritis shoulder in age group of 40-60 years ,3 females and 2 males and with no history of trauma, surgery around neck and shoulder, diabetes mellitus and any other musculoskeletal or neurological involvement were taken in the study.

Each patient was asked to sign an informed consent and give their will regarding being enrolled in the study. Each patient was assessed for pain, range of motion and functional disability (outcome measures) before intervention.

The intensity of pain was assessed by using numerical pain rating scale (NPRS). Disability was assessed by using Shoulder pain and disability index (SPADI) whereas the ranges were assessed using Goniometer for shoulder movements such as, flexion, abduction,internal and external rotation.

Intervention: Treatment given comprised of MET, capsular stretch and conventional physiotherapy. MET and Capsular stretch was given thrice a week for three weeks and post readings were taken after 3 weeks of treatment. Whereas conventional treatment was given for rest of three days per week for three weeks.

Reciprocal inhibition (MET) for Flexion, Abduction, External and Internal rotation have been used 3 repetition for each movement /set and 1 set per day and total 3 sessions per week for 3weeks

MET is followed by Capsular Stretching of inferior and posterior capsule of shoulder. Capsular stretch was given 3 times for both posterior and inferior capsule, 3 reps/day and 3 sessions/week for 3 consecutive weeks. The stretch was maintained for 10-15s.

Conventional treatment was given for remaining 3 days of week for 3 weeks which includes Hot packs, Codman's Pendulum exercises, shoulder wheel, shoulder pulley and stick exercises.

Hot pack was given 15 minutes daily prior to exercises on all weekdays for 3 weeks. Codman exercise includes 20 repetition per movement per set and total 2 sets per session. Shoulder wheel with 20 reps per set in both clockwise and anticlockwise directions and 2 sets/session with rest period of 30sec after each set. Shoulder pulley for 20 reps per set, 2 sets per session with rest of 30s after each set. Stick exercises were done with patient in standing holding a stick (any material). Patient was directed to hold it with full grip at distance of shoulder and raise it upwards as far as possible and hold for 10s. Same is done with stick held with arms at the back and patient is directed to go in full possible extension and hold for 10s. 20 reps per set, 2 sets per session with rest of 30s after each set.

Data Analysis and Results: All the statistical analysis was done by calculating Arithmetic Mean, reported with the standard deviation (SD). P value less than or equal to 0.05 were considered significant. The software used is SPSS 20.0 and paired t-test was conducted.

Results: Table I shows the comparative change in the pain intensity, shoulder disability and range of motion from baseline to post intervention scores.

Table 1. Mean and standard deviation of pain, ROM and disability for baseline and post intervention.

Outcome measure	Tool	Baseline Assessment (mean ± S.D)	Post-Intervention after 3 weeks (mean ± S.D)	Statistical Significance (p<0.05)
Pain Intensity	(NPRS)	6.6±1.14	4.4 ± .89	.000
Shoulder Disability	(SPADI)	51.4 ± 10.3	38.8 ± 13.9	.006
Range of Motion	Goniometer			
Flexion		122.4±10.6	135.6 ± 12.2	.000
Abduction		96.6±19.8	121.8 ±15.9	.001

Internal Rotation	37.2±21.4	52.2 ± 19	.003
External rotation	25.6±10.4	39.4 ± 13.7	.007

Discussion

This study was focused on improving range of shoulder movements in patients with peri-arthritic shoulder using MET along with capsular stretch. The main challenges associated with PA shoulder are stiffness of capsule and pain which results into restricted movements and hence disability. The main aim of study was to investigate the effects of “Muscle Energy Techniques along with Capsular stretch” on overall improvement of patients with PA shoulder. The basic advantage of this treatment protocol is that this is unique in its application as compared to traditional mobilizations and traditional exercises in clinical practice. General mobilizations sometimes prove very painful and inconvenient for some patients thus, MET resolves the issue of pain and discomfort during treatment. It improves the stretch threshold of patients, increases ROM as an immediate effect and also doesn't cause fatigue to both therapist and patient. The technique used is Reciprocal Inhibition in which an agonist muscle is made to contract and shortens; while its antagonist muscle goes for relaxation and thus lengthen so that motion can easily occur in the agonist muscle. The contraction of the agonist reciprocally inhibits antagonist so that smooth motion may occur. In application of MET, when specific movements stress the particular parts of the capsular tissue may result into mechanical changes like breaking up of adhesions, collagen realignment, or increased fiber glide. The results from present study are related to findings by M. Lokesh et al where they have postulated that in periarthritis shoulder a combination of treatment strategies are beneficial over single therapy alone.[25], also G.Manmeet Kaur et al has proved in their study that MET along with Conventional physiotherapy is more effective treatment combination in reducing pain in patients with adhesive capsulitis.[26]

MET was given 3 days in a week 3 sets/session for 3 movements and for remaining 3 days of week only conventional exercises were given. Capsular stretching of inferior and posterior capsules when given after MET decreased pain by relaxing the stiff capsule and hence further improved the results. Application of Hot packs prior to

intervention causes the vasodilatation and allows the nutrients to flush in and waste material is excreted out thus making muscles and capsule more relaxed

The improvement after capsular stretching in present study can be correlated with study done by Dhanasekaran.R where he has compared the capsular stretching and MET in patients with Frozen shoulder and found better improvement in patients who were treated with capsular stretching.[27] Though studies have already proved that both MET and Capsular stretching are techniques of choice in treating patients with peri-arthritis but the present study has shown significant improvement and patient compliance when the MET, Capsular stretching and conventional physiotherapy intervention are used together. Improvements in range of motion, pain threshold and disability index were reported by the patients. The treatment protocol used in the current study can be further implemented on large scale and can be recommended to be used for management of shoulder peri-arthritis.

CONCLUSION

This study has shown that MET is an exclusive treatment in Peri arthritis shoulder but when MET is applied along with posterior and inferior capsular stretching, it shows better results. The given protocol has helped patients to decrease pain and improved movements and thus allowed patients to perform conventional exercises with more ease and overcome their functional disability.

References

1. C.Cynthia.Norkin et al,4th edition, joint structure and function,pagno;233- 268
2. Lokesh M, Raja R, Prashantha S, Rajeev A. comparision of effectiveness of the combination of muscle energy techniques and conventional physiotherapy over conventional physiotherapy alone in periartthritis of shoulder: A randomized study. Journal of Evolution of Medical and Dental Sciences. 2015 Jan 12;4(4):545-55.
3. P. Sivasankar, Effect of Post isometric Relaxation Technique Versus Conventional Transcutaneous Electrical Nerve Simulation with Passive Stretching in Reducing Pain Syndrome of the upper Trapezius(2014)(ISSN 2321- 9203)
4. Cynthia C.Norkin et al, 3rd edition, measurement of joint motion, pgno;60-62

5. Narayan A, Jagga V. Efficacy of muscle energy technique on functional ability of shoulder in adhesive capsulitis. *Journal of Exercise Science and Physiotherapy*. 2014 Dec;10(2):72.
6. Sharmila B. Isometric muscle energy technique and non-specific neck pain in secondary school teachers-results of an experimental study. *Indian Journal of Physiotherapy and Occupational Therapy*. 2014 Apr 1;8(2):58.
7. Khuman PR, Surbala L, Patel P, Chavda D. Immediate Effects of Single Session Post Isometric Relaxation Muscle Energy Technique Versus Mulligan's Bent Leg Raise Technique on Pain and Hamstring Flexibility in Knee Osteoarthritis Participants: A Randomised Controlled Study. *Physiotherapy*. 2014 Sep;3(9).
8. Vastamaki H, Kettunen J, Vastamäki M. The natural history of idiopathic frozen shoulder: a 2-to 27-year followup study. *Clinical Orthopaedics and Related Research®*. 2012 Apr 1;470(4):1133-43.
9. Reddy BC, Metgud S. A randomized controlled trial to compare the effect of muscle energy technique with conventional therapy in stage ii adhesive capsulitis. *Int J Physiother Res*. 2014;2(3):549
10. J L Arun Kumar Baer, A comparative study to find the efficacy of mobilization with and without muscle energy technique in subjects with frozen shoulder:2013
11. Amir Iqbal, Hashim Ahmed et al, Efficacy of Muscle Energy Technique in Combination with Strain-counter strain Technique on Deactivation of Trigger Point Pain , *Indian Journal of Physiotherapy and Occupational Therapy*. July- September 2013, Vol. 7, No 3
12. Jain TK, Sharma NK. The effectiveness of physiotherapeutic interventions in treatment of frozen shoulder/adhesive capsulitis: a systematic review. *Journal of back and musculoskeletal rehabilitation*. 2014 Jan 1;27(3):247-73
13. Stephanie D Moore, Kevin G Laudner. Immediate effects of MET on posterior shoulder tightness: RCT. *Jour of Orthopedic and Sports Physical Therapy*. 2011;41(6):400-407
14. Mao CY, Jaw WC, Cheng HC. Frozen shoulder: correlation between the response to physical therapy and follow-up shoulder arthrography. *Archives of physical medicine and rehabilitation*. 1997 Aug 1;78(8):857-9.
15. Reeves B. The natural history of the frozen shoulder syndrome. *Scandinavian journal of rheumatology*. 1975 Jan 1;4(4):193-6
16. Ewald A. Adhesive capsulitis: a review. *Am Fam Physician*. 2011 Feb 15;83(4):417-22

17. Neviaser RJ, Neviaser TJ. The frozen shoulder: Diagnosis and management. Clin Orthop Relat Res. 1987;223:59–64
18. Denise K. Burns, Michael R. Wells, Gross Range of Motion in the Cervical Spine: The Effects of Osteopathic Muscle Energy Technique in Asymptomatic Subjects, JAOA, Vol 106, No 3, March 2006
19. Moore SD, Lauder KG, McLeod TA, Shaffer MA. The immediate effects of muscle energy technique on posterior shoulder tightness: a randomized controlled trial. Journal of orthopaedic & sports physical therapy. 2011 Jun;41(6):400-7.
20. Yang JL, Chang CW, Chen SY, Wang SF, Lin JJ. Mobilization techniques in subjects with frozen shoulder syndrome: randomized multiple-treatment trial. Physical therapy. 2007 Oct 1;87(10):1307-15
21. Yang JL, Lin JJ. Reliability of function-related tests in patients with shoulder pathologies. Journal of Orthopaedic & Sports Physical Therapy. 2006 Aug;36(8):572-6.
22. Brue S, Valentin A, Forssblad M, Werner S, Mikkelsen C, Cerulli G. Idiopathic adhesive capsulitis of the shoulder: a review. Knee Surgery, Sports Traumatology, Arthroscopy. 2007 Aug 1;15(8):1048-54.
23. Lenehan KL, Fryer G, McLaughlin P. The effect of muscle energy technique on gross trunk range of motion. Journal of osteopathic medicine. 2003 Apr 1;6(1):13-8
24. Shivakumar HB, Chanappa TS, Balasaravanan R, Swathi KR. A comparative study between the efficacy of high grade mobilization with active exercises versus capsular stretching with active exercises on patients with adhesive capsulitis. Journal of Evolution of Medical and Dental Sciences. 2014 Apr 7;3(14):3831-44.
25. Lokesh M, Raja R, Prashantha S, Rajeev A. comparison of effectiveness of the combination of muscle energy techniques and conventional physiotherapy over conventional physiotherapy alone in periartthritis of shoulder: A randomized study. Journal of Evolution of Medical and Dental Sciences. 2015 Jan 12;4(4):545-55.
26. Manmitkaur A Gill, Bhavika P Gohel, Sandhya K Singal. Effect of Muscle Energy Technique on Pain and Function in Adhesive Capsulitis -An Interventional Study. International Journal of health science and research Vol.8; Issue: 3; March 2018
27. Dhanasekaran R. Effectiveness of Conventional Therapy with Capsular Stretching Versus Muscle Energy Technique in the Management of Frozen Shoulder-A Comparative study (Doctoral dissertation, Shanmuga College of Physiotherapy, Salem)