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Research Article

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A Comparative Study of Muscle Energy Technique and Cross Body Stretch for Improving Posterior Shoulder Tightness and Pain in Patients with Shoulder Pain - A Randomised Controlled Study

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ABSTRACT

Introduction: Shoulder pain involves one of the impairments of posterior shoulder tightness. The posterior shoulder tightness can be determined by measuring shoulder horizontal adduction, also by internal rotation and low flexion range of motion and extension. There are several conditions which contribute to posterior shoulder tightness - rotator cuff tendinopathy, impingement, adhesive capsulitis and labral lesions. It has been found out that muscles like deltoid and rotator cuff also contribute to posterior shoulder tightness, so stretching the capsule as well as muscles, along with the conventional treatment will help in restoration of normal range of motion at the shoulder joint.

Aim: The aim of the study is to see the effect of muscle energy technique and cross body stretch in patients with shoulder pain for improving the posterior shoulder tightness and pain and to compare the effects of both the techniques.

Methodology: The study was conducted on 65 subjects who were diagnosed with rotator cuff related shoulder pain, adhesive capsulitis, labral lesions and who met the inclusion criteria and exclusion criteria. Subjects were divided into 2 groups, Group 1 subjects received Muscle Energy Technique along with the conventional treatment and group 2 subjects received Cross-Body Stretch along with the conventional treatment. Outcome measures were shoulder horizontal adduction range of motion via a goniometer and pain on numeric pain rating scale.

Result: Data was collected at the baseline and at the end of 4 weeks intervention for both the groups. The data collected was check for normality. For normally distributed data, paired t-test was applied for shoulder horizontal range of motion (p-value>0.231) and Mann-Whitney test is applied for pain (p>0.608).

Conclusion: Both the types of techniques were equally effective for treating posterior shoulder tightness.

Key Words: Adhesive Capsulitis, Cross-Body Stretch, Muscle Energy Technique, Posterior Shoulder Tightness, Rotator Cuff Related Shoulder Pain, Shoulder Horizontal Adduction

INTRODUCTION

Shoulder pain has a prevalence of 2.4 to 26% and it is the third most commonly complaint musculoskeletal and it becomes difficult to manage it because of its biomechanical complexity and its relationship between stability and mobility. One of the most common impairments of the shoulder is the posterior shoulder tightness which causes changes in the glenohumeral movement. posterior shoulder tightness is determined by measuring shoulder horizontal adduction or cross body adduction. It can also be measured by glenohumeral joint internal rotation range of motion measured at 90 degrees of shoulder abduction, low flexion range of motion and extension. Glenohumeral horizontal adduction can be quantified in supine position or side lying position.[1]

Conditions that are considered a contributor to posterior shoulder tightness includes posterior impingement, rotator cuff tendinopathy, subacromial impingement, making it a collection of rotator cuff related shoulder pain, adhesive capsulitis and labral lesions.[1,2]

Rotator cuff related shoulder pain has shown tight posterior capsule which causes some changes in the glenohumeral joint motion, which could further lead to impingement. As the rotator cuff tendinopathy is related to posterior shoulder tightness, main emphasis should be on the examination of

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horizontal adduction and internal rotation range of motion.[3]

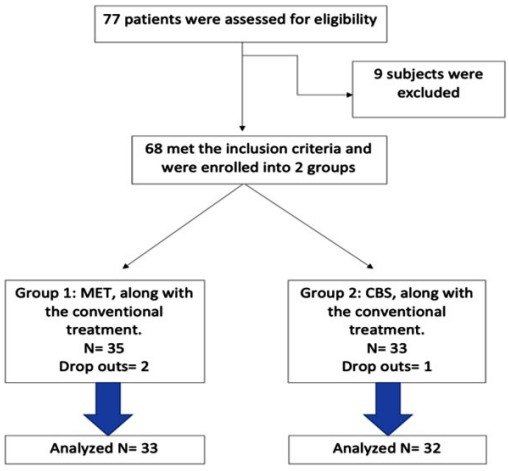
Adhesive Capsulitis is a condition which involves posterior capsule tightening, thereby limiting the global range of motion at the shoulder joint.[4]

The posterior rotator cuff and posterior deltoid contribute to posterior shoulder tightness as the function is external rotation and restraints external rotation. It could arise from the protective reflex activity of the infraspinatus, teres minor or posterior deltoid due to afferent discharge from GHJ capsule. So, not just capsular stretching, muscle-based treatment has been found effective such as stretching, massage, cryotherapy, instrument assisted soft tissue manipulation and Muscle Energy Technique.[1]

METHOD

The study conducted was a randomized controlled trial in which 77 subjects were screened according to the inclusion and exclusion criteria. 68 subjects met the inclusion criteria and participated in the study. 68 subjects were randomly allotted into 2 groups. Group 1: Muscle Energy Technique along with the conventional treatment and group 2: Cross body stretch along with the conventional treatment. The randomization was done with the help of the research randomizer software. Out of 68 subjects participated, only 65 could complete the study and 3 subjects were the drop-outs.

The inclusion criteria of the subjects were the shoulder pain from 3 months, diagnosed with Rotator cuff related shoulder pain, adhesive capsulitis, labral lesions. There should be global restriction in the glenohumeral joint passive range of motion with external rotation mostly affected. The subjects were excluded if there have been signs of glenohumeral joint arthritis, neurological involvement, pain or stiffness secondary to trauma or surgery, pain on NPRS >7 and passive range of motion is within normal limits.



Consort Flowchart No. 1

NPRS was used for the measurement of pain which is an 11-point scale. It ranges from 0 to 10, 0 score indicates "No Pain" whereas 10 score indicates "Worst pain imaginable". The NPRS can be delivered graphically or verbally. The subject selects a value that describes the pain the subject has been experiencing from over the past 24 hours.[5] NPRS has been found a valid, reliable and responsive outcome measure in subjects who has a primary complaint of shoulder pain.[6]

For the measurement of horizontal adduction, the subject was put in supine lying position and the tested elbow was kept in 90 degrees of elevation with the elbow in 90 degrees of flexion. The goniometer was aligned and the fulcrum was placed at the acromion process, the stationary arm was perpendicular to the floor while the moving arm was in parallel alignment with the midline of the shaft of humerus. The arm was then taken into horizontal adduction passively until the lateral border of scapula is cleared off the plinth and the angle is measured on the goniometer.[7]

All the measurement of shoulder horizontal adduction and pain was done by a blind assessor who was unaware of the group allocation at 0 and 4th week.

Procedure:

Group 1: Muscle Energy Technique was given to the subjects allocated to this group, along with the conventional treatment. The technique involved the passive horizontal adduction of the arm until first barrier to the motion by applying pressure to the distal humerus. The passive stretch was then applied for 3 seconds. The subject then self-attempts to horizontally abduct the affected arm at the 25% of their maximal effort while at the same time manual resistance is applied at the distal humerus having isometric contraction for 5 seconds. The subject's affected arm is then brought into the new range of horizontal adduction. It was repeated for 4 times.[8] The conventional treatment was given to all the subjects of this group along with the technique.

Group 2: Along with the conventional treatment, Cross-Body Stretch was given to the subjects allocated to this group. The subject's affected arm was pulled into horizontal adduction over to the opposite shoulder, given in sitting position.[2] The arm was stretched for 30 seconds for 5 repetitions per day for every alternate day.[9]

Conventional treatment included active assisted range of motion exercises- 10 repetitions*3 sets for 3 times a day, capsular stretches- 30 seconds hold with 30 seconds rest time for 5 repetitions per day, Maitland joint mobilizations for patients with adhesive capsulitis (Grade 3 and 4), closed kinetic chain scapular exercises, strengthening of shoulder musculature and hot pack (20 mins).[9,10,11,12]

Both the groups received the intervention 3 times per week for a total of 4 weeks duration.

Data Analysis:

The Statistical Package of Social Science (SPSS) for Windows version 23 was being used for data analysis. Normality of the distributed data was determined by the Shapiro-Wilk (SW) test. The significance value of the SW test was set at ($p<0.05$), the p-value for Shoulder Horizontal Adduction was less than 0.05 so that value was normally distributed, while the p-value for Pain was more than 0.05 so it was not normally distributed. Hence, the overall data is not normally distributed. The analysis was done for 65 subjects. For normally distributed data, paired t-test was used to determine the statistical significance between both the groups for normally distributed data and the Mann-Whitney test was used to determine the statistical significance between both the groups for non-normally distributed data.

RESULTS

The outcome measures were Shoulder Horizontal Adduction range of motion and Pain. The range of motion was measured by goniometer and the pain was measured by the NRPS.

There was no significant difference for the age and BMI between the groups. (Table 1).

Paired t-test was used to measure the significance of shoulder horizontal adduction and it was found out that there was no significant difference between the two techniques being used. However, there has been an overall improvement in the shoulder horizontal adduction range of motion by 31.54% from 0 to 4 weeks in group 1 and 29.66% in group 2.

Mann-Whitney test was used to measure the significance of the pain between the two groups and it was found out that there was no significant difference between the groups. However, there has been an overall improvement in the pain levels of 79.15% from 0 to 4 weeks in group 1 and 82.23% in group 2.

In table 1, the mean age of group 1 was 52.11 ± 6.41 with the BMI of 23.24 ± 2.481 while the mean age of group 2 was 49.91± 4.21 with the BMI of 24.62 ± 7.13.

In table 2, the mean value of shoulder horizontal adduction for group 1 was 26.4±5.016 and group 2 was 27.27±4.268 while it's p-value came out to be 0.231 which was non-significant. The mean value of pain for group 1 was 2.7±0.949 and group 2 was 3.45±1.753 with the p-value of 0.608, which was non-significant.

In table 3, within the group analysis was done and in group 1 there was an improvement of 31.54% in shoulder horizontal adduction range of motion and 79.15% in pain, while in group 2, there was an improvement in of 29.66% in shoulder horizontal adduction range of motion and 82.23% in pain.

DISCUSSION

Both the techniques- Muscle Energy Technique and Cross-Body Stretch showed an improvement in the shoulder range of motion and there was a reduction in the pain as well. Though the data showed no significant difference between the groups for the outcome variables, but there was clinical improvement seen in both the groups from 0 to 4 weeks.

There has been a similar study by Johnson et al in 2007 on the anterior versus posterior mobilization along the conventional treatment on the patients with Adhesive capsulitis and the result showed that there was no statistic difference between the groups in the pain score.[13]

A similar study by Yavanika, Meena Makhija in 2020 on the effectiveness of two types of stretches for improving posterior shoulder tightness and it was found out that both the types of stretches- cross body stretch and sleeper stretch were not statistically significant but showed clinical outcomes in terms of shoulder range of motion, pain and function of the shoulder.[14]

In a study by Maddox L Reed et al. in 2018 on the effect of Muscle Energy Technique to shoulder horizontal abductor to provide improvement in shoulder horizontal adduction for treating posterior shoulder tightness, the results demonstrated that Muscle Energy Technique may be beneficial in treating athletes with posterior shoulder tightness due to muscular limitations.[8]

There could be a reason for the non-significance of the data due to the short period of intervention. The 4 weeks study maybe was not a significant time to bring in the results as the pathological changes in the shoulder requires more time to heal. So, a longer period of intervention time would have brought the significant changes in the joint and the pathological changes as well.

Though the study has been beneficial in improving the shoulder range of motion and reducing the pain in subjects with posterior shoulder tightness. However, it was unable to prove the effectiveness of the either type of the technique over the another.

CONCLUSION

The study has demonstrated a positive outcome of both the types of technique for improving posterior shoulder tightness by improving the range of motion and reducing the pain level in patients with posterior shoulder tightness. However, there has been no significant difference between the groups.

LIMITATIONS

1. The study had limited number of subjects in each group.

2. The 4-week intervention protocol was a short span time for any significant difference to occur in any outcome measure.
3. No follow up was done

Future Scope:

1. Future study can be done measuring shoulder strength.
2. Long term intervention and follow up can be done.
3. No examination on kinetics of the shoulder joint was done along with this study, so it can be taken into account for further research.

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Ethical Clearance:

The study had conducted after getting appropriate consent from the patients and the study was reviewed and approved by Max Healthcare Ethical Board. The patients/ participants provided their written informed consent to participate in this study.

Source of funding: Nil

Conflicts of interest: Nil

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Table 1: Details of the demographic data

Demographic Details	Group 1 (N= 33)	Group 2 (N= 32)
Age (years)	52.11 ± 6.41	49.91± 4.21
BMI (kg/m²)	23.24 ± 2.481	24.62 ± 7.13

Table 2: Analysis of the SHAD and Pain

Variables	Mean + SD (Group 1)	Mean + SD (Group 2)	p-value
SHAD	26.4±5.016	27.27±4.268	0.231^{NS}
Pain	2.7±0.949	3.45±1.753	0.608^{NS}

Table 3: Within the group analysis

Variables	Group 1	Group 2
SHAD	31.54%	29.66%
Pain	79.15%	82.23%

SHAD: Shoulder Horizontal Adduction
NS: Non-significant