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ORIGINAL ARTICLE

Comparing The Effect of Acromioclavicular and Sternoclavicular Joint Mobilization with and without Specific Active Exercises in Chronic Sub Acromial Impingement Syndrome: Randomized Control Trail

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ABSTRACT

Objectives: Shoulder Impingement Syndrome is one of the common musculoskeletal disorders. It leads to significant function restriction, pain and disability. Manual Physical therapy is a non-invasive risk-free approach for managing Sub-acromial Impingement Syndrome. The objective is to determine the effectiveness of Acromioclavicular and Sternoclavicular joint mobilization with and without specific active exercises in chronic sub-acromial impingement.

Methodology: This Randomized control trail was conducted at Physical Therapy Department of Rawal Medical Point, Rawalpindi from November 2018 to February 2019. Inclusion criteria were both male and female patients with chronic shoulder pain for more than three months and age ranged between 30-55 years, while patients with history of trauma, bilateral shoulder pain, patients with RA, other systemic diseases and age less than 30 and greater than 55 were excluded. A total of 60 patients were selected in the study and were equally divided into two groups, i.e. A and B. Numeric Pain Rating Scale NPRS, Shoulder Pain and Disability Index SPADI, and Goniometry of Shoulder Range of Motion were used as assessment tools measured at baseline and at completion of 6week intervention. Data was analyzed through SPSS version 21.

Results: Statistically the results of both techniques were significant ($p<0.05$) but Clinically the group of patients treated with acromioclavicular and sternoclavicular joint mobilization with specific active exercises improved pain NPRS post-intervention 1.83±0.647, function SPADI score post-intervention 23.394±4.717 and more improvement in ROM as compared with the group of patients treated with acromioclavicular and sternoclavicular joint mobilization alone having NPRS post-intervention 3.56±0.679 and SPADI score post-intervention 32.021±5.0962 showing improvement in pain and function with comparatively less improvement in ROM.

Conclusion: It is concluded that if the patients with chronic sub-acromial impingement treated with acromioclavicular and sternoclavicular joint mobilization with specific active exercises, will manage symptoms like pain, restricted ranges and functions more effectively than treated with acromioclavicular and sternoclavicular joint mobilization alone.

Keywords: shoulder pain, sub-acromial impingement, acromioclavicular and sternoclavicular joint mobilization, specific active exercises, pain, range of motion.

INTRODUCTION

Shoulder disorders are ranked as third most common musculoskeletal disorders according to the American Academy of Orthopedic Surgeons after low back pain and knee pain, with shoulder impingement syndrome (SIS) being the most prevalence.(1, 2). Epidemiological studies have shown that lifetime shoulder pain prevalence reported to be ranged from 7% to 36% of the population.(3) 44 to 65% of individuals are attending physical and orthopedic therapy clinics with the complaint of shoulder impingement syndrome (SIS).(3) Sub-acromial impingement is the mechanical compression of structures like long head of biceps, rotator cuff musculature and sub-acromial bursa between the hook of acromion anteriorly and superiorly and greater tuberosity of humerus inferiorly during activities involving elevation or arm above shoulder height.(4)

Sub-acromial impingement may be primary or structural due to morphological changes like a hooked acromion, presence of osteophyte (sub-acromial spur), calcification in sub-acromial space, acromioclavicular arthrosis (inferior osteophyte) and varying acromial shapes.(6,7) Secondary or dynamic due to rotator cuff eccentric overload or insufficiency, scapular dyskinesia, posterior capsule stiffness, trapezius paralysis, ligamentous and Gleno-humeral laxity.(8)The prevalence of chronic shoulder pain based upon the country of origin of the epidemiological data.(5)

Different management strategies for impingement syndrome includes surgical interventions, drug therapy and non-operative rehabilitation. Southerst, D. and colleagues done a systemic review in 2015 and suggested that manual therapy including manipulation, mobilization, and traction is often recommended as a component of rehabilitation programs for the management of MSDs of extremities(6)

Rehabilitation program for the management of impingement syndrome include immobilization, strengthening of rotator cuff muscles and scapular stabilizer muscles and manual therapy maneuvers with relatively fruitful outcomes(7). Literature (8) reported that participants who undergo a treatment including combination of manual therapy maneuvers and mobility exercises for 3 weeks experienced reduction in pain as compared to those participants who get only exercise intervention.

It is evident from literature that those participants who undergo stretching and strengthening exercise program compared with participants those who underwent manual therapy maneuvers and exercise therapy directed to shoulder joint in addition to cervical spine and thoracic spine. After 3 to 4 weeks group of patients who underwent stretching exercise program and manual therapy demonstrated reduction in pain and improve functional capacity and strength compared with those who receive stretching exercise program. Before administration of rehabilitation thorough evaluation is recommended thus directing the practitioner to identify the causative factors and involved structures thus leading to the accurate diagnosis. All this will benefit the rehabilitation specialist to first address the causative factors and according to that prioritize the treatment goals and then design an individualized treatment program. The primary goal of treatment program for sub-acromial impingement is to alleviate the mechanical irritation of rotator cuff tendon by reducing muscle guarding, mechanical compression and altered kinematics thus promoting the restoration in tendon vascularity. (13-14)

The goal of the treatment in this current study was focused to improve the pain free range of motion, to decrease pain and to decrease the disability due to pain and restricted ROM of shoulder joint.

METHODOLOGY

Current (RCT) was held at Physical Therapy Department of Rawal Medical Point, Rawalpindi from November 2018 to February 2019. Inclusion criteria were male/female subjects with chronic shoulder pain for more than three months and age between 30-55 years, while subjects with previous trauma, bilateral shoulder pain, patients with RA, other systemic diseases and age less than 30 and greater than 55 were excluded. A total of 60 patients were selected in the study on the basis of inclusion criteria and were equally divided into two groups, i.e. A and B. 30 patients in Group A were treated with Acromioclavicular and Sternoclavicular joint mobilization including clavicle sternum traction for pain and hypo-mobility in sitting and supine lying, clavicle sternum cranial and caudal glide in supine lying, clavicle sternum ventral and dorsal glide in supine position, clavicle acromion ventral glide in siting and in prone lying position in grade I, II and III according to patient condition and tolerance with specific active exercises that were based on strengthening exercises including eccentric exercises targeting rotator cuff group of muscles and both eccentric/concentric exercises for scapular stabilizers. There were six exercises in this specific exercise program out of which two were eccentric exercises for supraspinatus, infraspinatus and teres minor (rotator cuff muscles), three exercises were concentric/eccentric exercises for middle and lower trapezius, rhomboids and serratus anterior (scapular stabilizers group of muscles) and the last one posterior shoulder stretch. Each exercise was done in 3 sets of 15 repetitions in each set once daily for 6 weeks. Hold time for posterior shoulder stretch was 30-45 sec, 3 reps twice daily. The exercises were planned and adjusted individually and progressed by using external loads (weights) and thera-bands in alternate weeks of rehabilitation program.

Whereas thirty patients in Group B were treated with Acromioclavicular and Sternoclavicular joint mobilization as given to Group A with nonspecific exercises and home plan, Transcutaneous electrical nerve stimulation (TENS) pulse mode, set as per patient tolerance for 10mins, Hot pack applied before intervention for 10min. For 6 weeks at 3 session per week and one session per day. Numeric Pain Rating Scale NPRS, Shoulder Pain and Disability Index SPADI, and Goniometry of Shoulder Range of Motion were used as assessment tools measured at baseline and at completion of 6week intervention. Data was analyzed through SPSS version 21 and statistical tests were applied at 95% level of significance α (0.05) to determine the difference between two interventions.

RESULTS

The study recruited 60 patients with chronic sub-acromial impingement and randomly placed into two groups. There were 21(35%) males and 39(65%) female patients. Mean age of Group A (n=30) is 39.20±6.96 whereas the mean age of Group B (n=30) is 38.73±6.10.

Table 1: between group analysis:

Paired t-Test		Group A		Group B	
Variable	Status	Mean±SD	P value	Mean±SD	P value
NPRS	Pre-intervention	6.23±1.04	.000	6.73±0.56	.000
	Post-intervention	1.83±0.64		3.56±0.67	
SPADI	Pre-intervention	63.56±9.46	.000	61.94±6.69	.000
	Post-intervention	23.39±4.71		32.02±5.09	

Table 1 shows that group A of patients treated with acromioclavicular and sternoclavicular joint mobilization with specific active exercises improved pain (NPRS) from pre-intervention 6.23±1.040 to post-intervention 1.83±0.647, function (SPADI) score pre-intervention 63.56±9.466 and post-intervention 23.394±4.717 and more improvement in ROM as compared with the group of patients treated with acromioclavicular and sternoclavicular joint mobilization alone having NPRS pre-intervention 6.73±0.568 and post-intervention 3.56±0.679 and SPADI score pre-intervention 61.94±6.6944 and post-intervention 32.021±5.0962.

Table 2:

Independent t-Test	Group A		Group B	
VARIABLE	Mean±SD	P Value	Mean±SD	P Value
NPRS	1.83±0.64	.000	3.56±0.67	.000
SPADI	23.39±4.71	.000	32.02±5.09	.000

Table 3: Table Showing Results For Paired Sample T-Test Of Range Of Motion

Paired t-test					
Group a			Group b		
Variable	Status	Mean±s.d	P value	Mean±s.d	P value
Rom Flexion	Pre-intervention	88.50±8.42	.000	94.4±5.17	.000
	Post-intervention	108±8.96		100.23±5.41	
Rom Abduction	Pre-intervention	80.56±1.09	.000	88.13±3.05	.000
	Post-intervention	115.10±4.5		93.26±4.05	
Rom External rotation	Pre-intervention	42.56±9.19	.000	45.46±4.91	.000
	Post-intervention	53.86±4.03		50.30±3.14	
Rom Internal rotation	Pre-intervention	45.7±6.30	.000	41.8±6.06	.000
	Post-intervention	56.26±6.39		47.8±5.4	
Rom Extension	Pre-intervention	33.10±6.01	.000	28.96±4.49	.000
	Post-intervention	38.13±5.47		32.23±3.91	
Rom Adduction	Pre-intervention	45.7±6.3	.000	30.83±2.8	.000
	Post-intervention	55.16±6.2		33.70±3.2	

Table 3 shows the mean shoulder flexion ROM of Group A improved from baseline score of 88.50±8.423 degrees to 108±8.963 degrees while the mean shoulder flexion ROM of Group B improved from baseline score of 94.40±5.17 degrees to 100.23±5.417 degrees. The mean shoulder extension ROM of Group A improved from baseline score of 33.10±6.019 degrees to 38.13±5.475 degrees while the mean shoulder extension ROM of Group B improved from baseline score of 28.96±4.491 degrees to 32.23±3.91 degrees. The mean shoulder abduction ROM of Group A improved from baseline score of 80.56±1.09 degrees to 115.10±4.50 degrees while the mean shoulder abduction ROM of Group B improved from baseline score of 88.13±3.05 degrees to 93.26±4.05 degrees. The mean shoulder internal rotation ROM of Group A improved from baseline score of 45.70±6.30 degrees to 56.26±6.39 degrees while the mean shoulder internal rotation ROM of Group B improved from baseline score of 41.80±6.06 degrees to 47.80±5.4 degrees. The mean shoulder external rotation ROM of Group A improved from baseline score of 42.56±9.19 degrees to 53.86±4.03 degrees while the mean shoulder external rotation ROM of Group B improved from baseline score of 45.46±4.911 degrees to 50.30±3.14 degrees. The mean shoulder adduction ROM of Group A improved from baseline score of 45.70±6.3 degrees to 55.16±6.20 degrees while the mean

shoulder adduction ROM of Group B improved from baseline score of 30.83±2.8 degrees to 33.70±3.2 degrees. Thus Group A showed significant improvement than Group B. Both interventions shows statistically significant results but clinically Group A showed more significant improvement in ROM, NPRS and SPADI score.

Thus, Statistically the results of both techniques were significant ($p<0.05$) but clinically the group of patients treated with acromioclavicular and sternoclavicular joint mobilization with specific active exercises improved pain NPRS and function SPADI score as compared with the group of patients treated with acromioclavicular and sternoclavicular joint mobilization alone.

DISCUSSION

This study demonstrated improvement in function and reduction in pain in both groups but subjects treated with Acromioclavicular and Sternoclavicular joint mobilization with specific active exercises improved pain (mean pre 6.23, mean post 1.83), and function SPADI score (mean pre-intervention 63.56 and mean post-intervention 23.39) more effectively as compared with the group of patients treated with Acromioclavicular and Sternoclavicular joint mobilization without specific active exercises(Pain mean pre-intervention 6.73, mean post-intervention 3.56 and function SPADI score mean pre-intervention 61.94 and post-intervention 32.021), as the outcomes were measured by NPRS and SPADI. Statistically both groups have significant p-value (less than 0.05), while clinically the Acromioclavicular and Sternoclavicular joint mobilization with specific active exercises shows added improvement in function and reduction in pain. The reason is probably the acromioclavicular joint and sternoclavicular joint mobilization with specific exercises focused on scapular stabilizers in specific pattern can enhance the function more than non-specific mobility exercises.

A study by Teresa Holmgren have shown that specific eccentric exercises for scapula stabilizers and rotator cuff muscle appear to have significantly greater improvement in shoulder function and pain in patients with persistent sub-acromial impingement.(13-14) In this current study we applied the treatment protocol involving specific eccentric exercises for scapula stabilizers and rotator cuff muscle in combination with Acromioclavicular and Sternoclavicular joint mobilization and the results have shown significant improvement in shoulder function and ROM($p<0.05$).

Another study by McClure in 2006 showed that strengthening exercises for scapula stabilizers proved to helpful in normalizing altered shoulder kinematics in patients with shoulder impingement (15-16). Similarly in this current randomized control trail we incorporated specific exercise program directed to be implemented on scapular stabilizers in addition to manual mobilization of Acromio-clavicular and Sterno-clavicular joints and results have shown the significant improvement in functional activities of patients that were being restricted previously due to altered shoulder kinematics causing shoulder impingement.

A Systemic Review performed by Camarinos and colleagues in (2009) and found Over 13 million Americans visited their doctor for painful shoulder conditions in 2003. The prevalence of shoulder pain has been reported in up to 50% of the general population and according to the American Academy of Orthopedic Surgeons, it ranks as the third most common musculoskeletal complaint behind knee and spinal disorders. In this review manual therapy appear to be effective in increasing active and passive range of motion and trend following decrease in pain was found but effect on function and quality of life remain inconclusive. Although therapeutic exercise has been shown to be effective in treating shoulder impingement symptoms very few studies have evaluated the effectiveness of incorporating Gleno- humeral joint mobilizations (9). Similarly in current study it is demonstrated in the results that the participants who receive therapeutic active exercises in conjunction with manual mobilization of acromio-clavicular and sterno-clavicular joint have more reduction in pain and significant improvement in functional capacity and range of motion

CONCLUSION

It is concluded that patients with sub-acromial impingement if treated with acromioclavicular and sternoclavicular joint mobilization with specific active exercise program will report more improvement in pain, disability and restricted ROM of shoulder joint as compared to patients treated with mobilization alone.

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