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A STUDY ON EFFECTIVENESS OF SCAPULAR PNF TECHNIQUES ON PAIN AND DYNAMIC STABILITY OF SCAPULA IN ADHESIVE CAPSULITIS OF SHOULDER JOINT

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ABSTRACT

Background of the study: Adhesive capsulitis is a common musculoskeletal disorder of shoulder joint caused by inflammation and adhesion formation in the capsule and synovium leading to pain, stiffness, and limited function of the glenohumeral joint.Adhesive capsulitis is often more prevalent in women, individuals 40-65 years old, and in the diabetic population, with an occurrence rate of approximately 2-5% in the general population, and 10-20% of the diabetic population. Objective of the study is to find out the effectiveness of scapular PNF technique in the management of pain and dynamic stability among the adhesive capsulitis patients. **Methodology:** Twenty clinically diagnosed adhesive capsulitis subjects were selected for the study that fulfilled the inclusion and exclusion criteria and were divided into two groups. Group A- Scapular proprioceptive neuromuscular facilitation techniques along with Conventional Physiotherapy (IFT) Group B - Conventional physiotherapy (IFT) with exercises, Prior consent form will be obtained. , On the first day pr test will be conducted Subjects of both the group were assessed for pain on Numerical Pain Rating scale and Dynamic Scapular stability by using Lateral scapular slide test. Then post test score is obtained after 4 weeks from each group. **Result:** The calculated 't' value is 3.83 and the't' table value is 2.878 at 0.005 level of significance. It shows that there is significant difference between scapular PNF techniques along with IFT and conventional physiotherapy with exercises in the management of pain among subjects with adhesive capsulitis. **Conclusion:** concluded that scapular PNF techniques along with Conventional Physiotherapy is more effective than conventional physiotherapy with exercises in improving Dynamic scapular stability and reduction of pain in subjects with adhesive capsulitis.

Keywords: Adhesive capsulitis, Musculoskeletal disorder, Shoulder joint, Inflammation

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INTRODUCTION

Adhesive capsulitis is a common musculoskeletal disorder of shoulder joint caused by inflammation and adhesion formation in the capsule and synovium leading to pain, stiffness, and limited function of the glenohumeral joint. There is global restriction of both passive and active range of motion (ROM) of gleno humeral joint mostly external rotation and abduction of shoulder joint (Ebenezar, 2006).

Adhesive capsulitis is often more prevalent in women, individuals 40-65 years old, and in the diabetic population, with an occurrence rate of approximately 2-5% in the general population, and 10-20% of the diabetic population. If an individual has adhesive capsulitis they have a 5-34% chance of having it in the contra lateral shoulder at some point. Simultaneous bilateral involvement has been found to occur in approximately 14% of cases. Other associated risk factors include: trauma, prolonged immobilisation, thyroid disease, stroke, myocardial infarcts, and presence of autoimmune disease (Joshi, 2011). The condition usually starts with one shoulder and commonly affects the contralateral side years after the onset of symptoms in the first shoulder but it does not affect the same shoulder twice. In 6 to 17% of patients, the other shoulder becomes affected within five years (Binder, 1984)

The glenohumeral joint is a ball-and socket synovial joint consisting of the shallow glenoid fossa of the scapula and the large, rounded head of the humerus. It contains a joint capsule, a fibro cartilage rim called a labrum, and numerous ligaments. In adhesive capsulitis, there is a lack of synovial fluid, which normally helps the shoulder joint, a ball and socket joint, move by lubricating the gap between the humerus (upper arm bone) and the socket in the shoulder blade. The shoulder capsule thickens, swells, and tightens due to bands of scar tissue (adhesions) that have formed inside the capsule. As a result, there is less room in the joint for the humerus, making movement of the shoulder stiff and painful. This restricted space between the capsule and ball of the humerus distinguishes adhesive capsulitis from a less complicated, painful, stiff shoulder recurs (Maheswari, 2011).

There are commonly 3 stages of adhesive capsulitis:

Acute/freezing/painful phase: gradual onset of shoulder pain at rest with sharp pain at extremes of motion, and pain at night with sleep interruption which may last anywhere from 3-9 months.

Adhesive/frozen/stiffening phase: Pain starts to subside, progressive loss of glenohumeral motion in capsular pattern. Pain is apparent only at extremes of movement. This phase may occur at around 4 months and last til about 12 months.

Resolution/thawing phase: Spontaneous, progressive improvement in functional range of motion which can last anywhere from 1 to 2 years (Ebnezar, 2010).

Two types of adhesive capsulitis,Primary and secondary adhesive capsulitis. Primary adhesive capsulitis occurs spontaneously without a specific precipitating event and results from a chronic inflammatory response with fibroblastic proliferation, which is an

abnormal response from the immune system. Secondary adhesive capsulitis occurs following trauma, shoulder injury or surgery, and may be associated with other co-morbid condition such as diabetes, rotator cuff injury, cerebro vascular accident (CVA) or cardiovascular disease (Rizk, 1982).

Typical symptoms includes, patients note a decreased ability to reach behind the back when fastening a garment or removing a wallet from a back trouser pocket. The initial discomfort is described by many patients as a generalized shoulder ache with difficulty pinpointing the exact location of the discomfort. The pain may radiate both proximally and distally, is aggravated by movement and alleviated with rest. Sleep may be interrupted if the patient rolls on the involved shoulder. This condition progresses to one of severe pain accompanied by stiffness and decreased range of motion. The stiffening increases to the point where the natural arm swing that accompanies normal gait is lost. The patient tries to compensate for this loss by using other muscles and increasing scapular rotation to accomplish various activities. This places additional strain on the other muscle groups, leaving them overworked and tender (Joshi, 2011).

Statement of study: A Comparative study on the effectiveness of scapular PNF technique and conventional physiotherapy on pain and Dynamic scapular stability among subjects with adhesive capsulitis

Need of the study: Adhesive capsulitis is a musculoskeletal condition that has a disabling capability. It affects 2 to 5% of general population. Patients with adhesive capsulitis suffer with pain and long-term ROM deficits. Scapular PNF technique with Interferential therapy has shown significant result in reduction of pain and Dynamic scapular stability and functional activities in subjects with adhesive capsulitis.

Objectives of the study:

To find out the effectiveness of scapular PNF technique in the management of pain among the adhesive capsulitis patients
To find out the effectiveness of scapular PNF technique on Dynamic scapular stability among the adhesive capsulitis patients
To find out the effectiveness of conventional physiotherapy in the management of pain among the adhesive capsulitis patients
To find out the effectiveness of conventional physiotherapy on Dynamic scapular stability among the adhesive capsulitis patients
To compare the effectiveness of Scapular PNF technique, conventional physiotherapy in the management of pain among the adhesive capsulitis patients
To compare the effectiveness of Scapular PNF technique, conventional physiotherapy on Dynamic scapular stability among the adhesive capsulitis patients

Dynamic Scapular Stability: The ability to position and control movements of the scapula during upper limb function. The inability to achieve this stable base frequently accompanies the development of shoulder and upper limb pain and pathology. (Lewis, 2003).
Interferential Therapy: Interferential current is the resultant current produced when two alternating medium frequency currents are applied simultaneously at the point of intersection in a given medium (skin) (Singh, 2012).

The lateral scapular slide test (LSST): Developed by Kibler is an indirect method of examining the scapular muscle strength by measuring scapular symmetry in various load positions. LSST is a simple, less time-consuming and clinically approved test to evaluate scapular stability in shoulder rehabilitation protocols. Kibler initially recognised a 1-cm side-to-side difference in scapular positions as being clinically significant. Then he found that in the injured athlete, the side-to-side differences are greater than 0.63 cm, with a range of 0.83 to 1.75 cm. Therefore, for purposes of clinical evaluation, he has established 1.5 cm of asymmetry as the threshold of abnormality and accepted this in any three positions of the test (Kibler, 1998).

Numerical pain rating scale (NPRS): Measures the subjective intensity of pain. It is an 11 point scale from 0 - 10. Patients verbally select a value that is most in line with the intensity of pain that they have experienced in the last 24 hours. The NPRS has good sensitivity while producing data that can be statistically analyzed (Williamson & Hogger., 2005)

METHODOLOGY

The study design adopted was pre test and post test, experimental design. The study was conducted in Physiotherapy outpatient department, RVS College of Physiotherapy, Sulur, Coimbatore. 20 clinically diagnosed adhesive capsulitis subjects were selected for the study who fulfilled the inclusion and exclusion criteria and were divided into two groups. Intervention to Group A was Scapular Proprioceptive neuromuscular facilitation techniques along with Conventional Physiotherapy (IFT), and Group B - Conventional physiotherapy (IFT) with exercises. Subjects of both the group were assessed for pain on Numerical Pain Rating scale and Dynamic Scapular stability by using Lateral scapular slide test.

Dependent variable were Pain and Dynamic scapular stability, Independent variables were Scapular PNF technique along with conventional physiotherapy and Conventional Physiotherapy with Exercises

Measurement tools

Variables	**Tools**
Pain	Numerical Pain Rating Scale (NPRS
Dynamic Scapular stability	Lateral scapular slide test (LSST)

Inclusion Criteria were Clinically diagnosed Adhesive capsulitis Patients,Age group between 50-60years, Both male and female, Pain in the shoulder for at least 3 months, Patients who are co operative, Patients who are willing to participate.

Orientation to the subjects: Before collection of data all the subjects were explained about the purpose of the study. The investigator had given a detailed orientation about various test procedures such as Lateral scapular slide test to assess Dynamic scapular stability which affect the shoulder function. The concern and full cooperation of each participant was sought after complete explanation of the condition and demonstration of the procedure involved in the study.

Materials used Client consent form, Patient Consent form, IFT Equipment, Couch, Pillow, Bed spread or towel, Inch tape

Test Administration

a) Pain assessment by Numerical pain rating scale (NPRS)

Measure the subjective intensity of pain; It is an 11 point scale from 0 - 10. Patients verbally select a value that is most in line with the intensity of pain that they have experienced in the last 24 hours. The NPRS has good sensitivity while producing data that can be statistically analysed.

b) Lateral scapular slide test (LSST) to assess Dynamic Scapular stability

The lateral scapular slide test (LSST) developed by Kibler in 2003 is an indirect method of examining the scapular muscle strength by measuring scapular stability in various load positions The examiners measured the distance from the T7 spinous process to inferior angle of scapula in all three arm positions; this linear distance was defined as the scapular index.

- The first position was of the arm relaxed at the sides (0° of shoulder abduction).
- The second was the subject's hand around the waist with the web space between the thumb and second finger placed on the lateral iliac crest (45° of shoulder abduction);
- The third was with the arm abducted at 90° and in full internal rotation.

Treatment procedure: On first visit after getting consent form assessing the patient before the treatment begins. In our project we have assigned the treatment protocol for 4 weeks.

Therapeutic IFT: Patient is in sitting position. 4 electrodes are applied over the area of affected shoulder, so that the point of intersection of each current fell down on the point where pain perceived. The pulse duration was 200-300ms.. Amplitude-modulated frequency (AMF) = 100 Hz. The physical therapist will be responsible for increasing the amplitude of the current until the participant reports feeling a "strong but comfortable tingling" is maintained. In the case of decreased sensation, the amplitude of the current will be increased until the participant reaches the previous feeling. The treatment time is 15 minutes. The amplitude can be maintained until the contraction is visible. Sessions /day - 1 session

Scapular PNF Technique – Rhythmic Initiation

A) Anterior Elevation Posterior Depression

Patient position: Patient lie on the unaffected side

Therapist Position: Standing behind the patient, placing one hand superior border of scapula and other on inferior angle of scapula

Procedure; The patient is instructed to Push up and Push down the scapula against the manual resistance given by therapist.

Repetitions: 5, Hold time:5 seconds repetitions, Rest time: 2 seconds Session/Day: 3 times

B) Posterior Elevation Anterior Depression

Patient position: Patient lie on the unaffected side.

Therapist Position : Standing behind the patient, placing one hand superior border of scapula and other on inferior angle of scapula

Procedure: The patient is instructed to push back and Push fronts the scapula against the manual resistance given by therapist.

Repetitions: 5 repetitions, Hold time: 5 seconds, Rest time: 2 seconds Session/Day: 3 times

EXERCISES

Sl no	**Exercise**	**Patient position & Therapist position**	**Procedure**	**Photo**
1.	**Protraction**	Patient : standing Therapist : standing near to patient	Patient moves the shoulder blades forward Repetitions : 10times Hold time : 5 sec Rest time : 2 sec session/day : 3 times	
2.	**Retraction**	Patient : standing Therapist : standing near to patient	Patient moves the shoulder blades Backward Repetitions : 10times Hold time : 5 sec Rest time : 2 sec session/day : 3 times	

Sl no	**Exercise**	**Patient position & Therapist position**	**Procedure**
3.	**Elevation**	Patient : standing Therapist :	Patient moves the shoulder blades Upwards Repetitions : 10times Hold time : 5 sec Rest time : 2 sec

		standing near to patient	session/day : 3 times
4.	**Depression**	Patient : standing Therapist : standing near to patient	Patient moves the shoulder blades Downwards Repetitions : 10times Hold time : 5 sec Rest time : 2 sec session/day : 3 times

Sl no	**Exercise**	**Patient position & Therapist position**	**Procedure**
5.	Inferior capsular stretch	Patient : Standing Therapist : standing near to patient	Patient raise the involved arm over and behind head, elbow bent. Grasp elbow of involved arm with uninvolved arm , pull gently until a stretch is felt. Repetitions : 5 times Hold time :15 sec Rest time : 2 sec session/day : 3 times
6.	Anterior capsular stretch	Patient : stand back to the couch with reachable distance in walk standing position,	Patient has to Grasp the hand on the window bar by extending the shoulder , patient lunge forward and down until feels stretch. Repetitions : 5 times Hold time :15 sec Rest time : 2 sec session/day: 3 times

		Therapist : standing near to patient	

Sl no	Exercise	Patient position & Therapist position	Procedure
7.	Pendulum (Codman's) exercise	Patient: stands with the trunk flexed, hip at 90 degrees. The arm hangs loosely downwards. Therapist : standing near to patient	Patient moves the trunk slightly back and forth, to initiate the pendulum or swinging motion. Flexion, extension, horizontal abduction, adduction and circumduction can be done. time : 3 - 5 minutes session/day : 3 times
8.	Wall climbing exercise	Patient: stand face to the wall. Therapist : standing near to patient	Patient standing one arm distance to the wall, fingers can just touch it. Walk the fingers of y injured arm up the wall as high untill feel stretch. Then. Slowly walk your fingers back down to the starting position. Repetitions : 10 times Hold time :15 sec Rest time : 2 sec session/day: 3 times

Table 1: Exercise protocol

Collection of data Twenty clinically diagnosed Adhesive capsulitis subjects aged between 50 - 60 years who fulfilled the inclusion and exclusion criteria and were divided into two groups. Group A- Scapular proprioceptive neuromuscular facilitation (PNF) technique with Conventional Physiotherapy. Group B - conventional Physiotherapy with exercises both the group was given treatment for 4 weeks. Before and after 4 weeks of treatment intervention, Dynamic Scapular stability and pain was evaluated by Lateral scapular slide test and NPRS and values were recorded.

Statistical techniques. The collected data were analyzed by paired 't' test to find the

significance difference between pre and post-test values of experimental group and further unpaired 't' test was applied to find out the difference between groups.

Data Analysis And Results: The chapter deals with systematic presentation of the analyzed data followed by the interpretation of the data. Paired't' test was used as a parametric test to find the intra group significance. Unpaired' test was used as a parametric test to find the inter group significance.

Measurement	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	7.1	4.3	0.81	16.76*
Post test	2.8			

*0.005 level of significance

Table: 2: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post-test values of pain among Group A.

The calculated't' value is 16.76 and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' value is more than the 't' table value, it concludes that there is significant difference in pain following scapular PNF techniques along with conventional physiotherapy among subjects with adhesive capsulitis .

Measurement	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	7.6	2.8	0.91	9.71*
Post test	4.8			

*0.005 level of significance

Table: 3. Mean value, mean difference, standard deviation and paired 't' value between pre and posttest values of pain among Group B.

The calculated 't' value is 9.71 and the't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' value is more than't' table value, it shows that there is significant difference in pain following conventional physiotherapy with exercises among subjects with adhesive capsulitis.

Sl. No	Groups	Improvement		Standard deviation	Un paired 't' test
		Mean	Mean Difference		
1	Group-A	4.3	1.5	0.87	3.83*
2	Group-B	2.8			

Table: 4. The table shows the mean value, mean difference, standard deviation and unpaired 't' value of pain between Group A and Group B, 005 level of significance

The calculated 't' value is 3.83 and the 't' table value is 2.878 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value, it shows that there is significant difference between scapular PNF techniques along with conventional physiotherapy and conventional physiotherapy with exercises in the management of pain among subjects with adhesive capsulitis .

Measurement	Mean		Mean difference	Standard deviation	Paired 't' value
Pre test	P1	14.9			
	P2	16	1.9	0.40	11.08
	P3	16.5			
Post test	P1	13	1	0.38	9.11
	P2	15			
	P3	15	1.5	0.49	10.38

*0.005 level of significance

Table: 5. The table shows mean value, mean difference, standard deviation and paired't' value between pre and post-test values of Dynamic scapular stability among Group A.

The calculated 't' value of position 1 , 2 and 3 are 11.08, 9.11 , and 10.38 respectively and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, it concludes that there is significant difference in dynamic scapular stability following scapular PNF techniques along with conventional physiotherapy among subjects with adhesive capsulitis

Measurement	Mean		Mean difference	Standard deviation	Paired 't' value
Pre test	P1	15.5	0.5	0.49	9.05
	P2	15	0.5	0.58	
	P3	14.7			10.08
			0.3	0.28	
Post test	P1	15			8.05
	P2	14.5			
	P3	14.4			

*0.005 level of significance

Table 6: Mean value, mean difference, standard deviation and paired 't' value between pre and posttest values of Dynamic scapular stability among Group B.

The calculated 't' value of position 1 , 2 and 3 are 9.05, 10.08 , and 8.05 respectively and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, it concludes that;

There is significant difference in dynamic scapular stability following conventional physiotherapy with exercises among subjects with adhesive capsulitis

Sl. No	Groups	Improvement		Standard deviation	Un paired 't' test
		Mean	Mean Difference		
1	Group-A	1.9		0.53	2.27
	P1	1	1.4		
	P2	1.5		0.40	2.95
	P3		0.5		
	Group-B	0.5		0.38	1.71
2	P1	0.5	1.2		
	P2	0.3			
	P3				

*0.005 level of significance

Table 7: The calculated unpaired't' values are 2.27, 2.95 and, 1.71 and the 't' table value is 1.610 at 0.005 level of significance.

Since the calculated 't' values are more than 't' table value, it shows that there is Significant difference in Dynamic scapular stability between scapular PNF techniques along with conventional physiotherapy and conventional physiotherapy with exercises among subjects with Adhesive capsulitis

RESULTS

20 subjects with Adhesive capsulitis were selected for the study. The subjects were randomly divided into 2 equal groups, group A and group B. For Group A, Scapular PNF technique along with Conventional Physiotherapy (IFT) were given in massed practice form and for group B, conventional physiotherapy with exercises were given. Both group A and group B subjects were treated for 4 weeks.

Analysis of Dependent Variable Shoulder pain in Group A: The calculated 't' value is 16.76 and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' value is more than the 't' table value, it concludes that there is significant difference in pain following scapular PNF technique along with IFT among subjects with adhesive capsulitis .

Analysis of Dependent Variable Shoulder pain in Group B: The calculated 't' value is 9.71 and the 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value, it shows that there is significant difference in pain following conventional physiotherapy with exercises among subjects with adhesive capsulitis.

Analysis of Dependent Variable Pain between Group A and Group B: The calculated 't' value is 3.83 and the 't' table value is 2.878 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value, it shows that there is significant difference between scapular PNF technique along with IFT and conventional physiotherapy with exercises in the management of pain among subjects with adhesive capsulitis .

Analysis of Dependent Variable Dynamic scapular stability in Group A: The calculated 't' value of position 1 , 2 and 3 are 11.08, 9.11 , and 10.38 respectively and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, it concludes that there is significant difference in dynamic scapular stability following scapular PNF techniques along with IFT among subjects with adhesive capsulitis

Analysis of Dependent Variable Dynamic scapular stability in Group B: The calculated 't' value of position 1 , 2 and 3 are 9.05, 10.08 , and 8.05 respectively and 't' table value is 3.250 at 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, it concludes that there is significant difference in dynamic scapular stability following Conventional Physiotherapy with exercises among subjects with adhesive capsulitis

Analysis of Dependent Variable Dynamic scapular stability between Group A and Group B: The calculated 't' values are 2.27, 2.95 and 1.71 respectively and the't' table value is 1.610 at 0.005 level of significance. Since the calculated 't' values are more than 't' table value, it shows that there is significant difference in Dynamic scapular stability between scapular PNF techniques along with Conventional Physiotherapy and conventional physiotherapy with exercises among subjects with Adhesive capsulitis.

When comparing the mean values of Group A and B, Group A shows more difference than Group B. Hence, it is concluded that scapular PNF techniques along with Conventional Physiotherapy is more effective than conventional physiotherapy with exercises in improving Dynamic scapular stability and reduction of pain in subjects with adhesive capsulitis.

DISCUSSION

Adhesive capsulitis (AC), is an insidious painful condition of the shoulder persisting more than 3 months. This inflammatory condition that causes fibrosis of the glenohumeral joint capsule is accompanied by gradually progressive stiffness and significant restriction of range of motion (typically external rotation). However, the patients may develop symptoms suddenly and have a slow recovery phase. Mezia *et al*., (2014)

Alaca *et al*., (2011) - Conducted the study on 30 patients and they were randomly assigned to two groups. In addition to the standard rehabilitation program the PNF group received proprioceptive neuromuscular facilitation techniques 10 repetitions and the rest period is 10 seconds and the other group received shoulder exercises .Administration of PNF resulted in earlier functional gains in patients with shoulder syndrome.

From the results it is evident that Group A subjects had improvement in pain and scapular stability following Scapular PNF technique along with Conventional Physiotherapy(IFT). The calculated paired 't' value for Group A is 16.57 which is greater than the table 't' value ie 3.250 at 0.005 level of significance. This indicates Scapular PNF techniques with IFT is effective in reducing shoulder pain . This is supported by Park *et al*.,(2013) and Alaca *et al*., (2011) .

Bertoft *et al*., (1999) did a study to compare the effect of enhanced versus limited Therapeutic Alliance on pain intensity and muscle pain sensitivity in patients with Shoulder pain receiving active interferential current therapy (IFC). 117 participants were randomly divided into 4 groups. He concluded that IFC appears to lead to clinically meaningful improvements in outcomes when treating patients with Persistant Shoulder Pain.

Stenstrom *et al.,(*2007) evaluated a home exercise program in the management of patients with shoulder pain. In this case the program lasted for 6 weeks and was followed up after an additional 4 weeks. . Relatively short durations of exercise (15 minutes per day) appear to result in significant improvements in pain and function

As per the result it is evident that Group B subjects had improvement in pain following conventional physiotherapy (IFT)with exercises. The calculated paired 't' value for Group B is 9.71 which is greater than the table 't' value ie 3.250 at 0.005 level of significance. This indicates conventional physiotherapy with exercises are effective in reducing Shoulder pain This is supported by Correa *et al.,* (2013) and Manske, *et al.,* (2008).

Gulsen *et al*., (2016) The aim of our study was to compare the initial effects of scapular proprioceptive neuromuscular facilitation techniques and classic exercise interventions with physiotherapy modalities on pain, scapular position , range of motion, and function in adhesive capsulitis. Fifty-three

subjects were allocated to 2groups: scapular proprioceptive neuromuscular facilitation exercies and physiotherapy modalities and classic exercise and physiotherapy modalities,.Both groups showed significant differences in shoulder range of motion .. Proprioceptive neuromuscular facilitation, exercise, and physiotherapy modalities had immediate effects on adhesive capsulitis in our study.

From the results it is evident that group A subjects had improvement in Dynamic scapular stabilty following Scapular PNF techniques along with conventional physiotherapy (IFT). The calculated paired 't' value for Group A are 11.08 ,9.11 , 10.38 which is greater than the table 't' value i.e. 3.250 at 0.005 level of significance. Hence Scapular PNF techniques is effective in Dynamic scapular stability and pain. This is supported by Park *et al*.,(2013).

Evan *et al.,* (2009) conducted a study with 80 patients with Adhesive capsulitis shoulder and completed 6 sessions of Interferential therapy and stretching exercises twice weekly for 3 weeks. Patient outcome was classified at the end of treatment based on the perceived recovery. He concluded that patients with Adhesive capsulitis shoulder had dramatic improvement with Interferential therapy and stretching exercises.

From the results it is evident that Group B subjects had improvement in Dynamic scapular stability following conventional physiotherapy with exercises. The calculated paired't' values for Group B are 9.05 , 10.08 , 8.05 which is greater than the table 't' value i.e. 3.250 at 0.005 level of significance. This states that Conventional Physiotherapy with exercises are effective in Dynamic scapular stability and shoulder pain.This is supported by Alaca *et al*.,(2011)

Here the pain is relieved based on the pain gate theory. the short duration pulses at a frequency of 100hz may stimulate the large diameter Ab fibers,which have an effect on the pain gate inthe posterior horn,that inhibit transmission of small diameter nociceptive traffic (C and Ad fibers),which effectively closes the gate to painful impulses. Melzack and Wall (1965)

PNF technique helps to develop scapular muscles strength and endurence , facilitate stabiity , mobility , Neuro muscular control , and co ordinated movements. Thereby scapula returned to its normal position and mechanics which was alered due to dysfunction. The scapular muscles dynamically position the glenoid so that efficient gleno humeral movement can occur. . Paine etal.,(1993)

In this study, the comparison of Scapular PNF techniques and conventional physiotherapy is done. Scapular PNF techniques are are mainly focused to train the Scapular muscles, have been shown to reduce pain and improve Dynamic scapular stability with promising results. More specifically, clinical trials that included, the Scapular PNF techniques along with IFT have demonstrated that effectively reduces pain and improve Dynamic scapular stability. This comparative study shows that Group A treated with Scapular PNF techniques along with Conventional Physiotherapy(IFT) in treating patients with Adhesive capsulitis in the management of pain and dynamic scapular stability than group B treated with conventional physiotherapy with exercises. The Group A is found to be more effective than Group B.

CONCLUSION

The result is showed that Scapular PNF technique along with Conventional Physiotherapy is effective in reducing Shoulder pain and improving Dynamic scapular stability. When comparing conventional physiotherapy with exercises on pain among Adhesive capsulitis the statistical result showed that there was significance difference between both the groups, but when analyzing mean difference of both groups, Group A received Scapular PNF techniques along with conventional physiotherapy showed more difference than Group B.

When comparing Scapular PNF technique with conventional physiotherapy and conventional physiotherapy with exercises on Dynamic scapular stability, the statistical result showed that there was significant difference between both the groups. When analyzing mean difference of both groups, group A received Scapular PNF techniques along with conventional physiotherapy showed more difference than group B.

Hence we can conclude that Scapular PNF technique along with conventional physiotherapy(IFT) were found to be more effective than conventional physiotherapy with exercises in reducing pain and improving Dynamic scapular stability among Adhesive capsulitis subjects.

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