

EFFECT OF SCAPULAR PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND SCAPULAR MOBILIZATION VERSUS SCAPULAR MOBILIZATION ALONE ON PAIN AND DISABILITY AMONG PATIENTS WITH ADHESIVE CAPSULITIS

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Abstract: Background: An idiopathic condition called adhesive capsulitis is characterized by fibrosis, a decreased glenoid capsule volume, and increasing shoulder joint discomfort and range of motion (ROM) loss that can cause severe impairment.

Objective: The purpose of this study was to compare the effect of scapular Proprioceptive Neuromuscular Facilitation [PNF] and scapular mobilization versus scapular mobilization alone on pain and disability in subjects with adhesive capsulitis.

Methodology: 18 subjects with adhesive capsulitis based on inclusion and exclusion criteria were divided into Group-A and Group-B. Group-A subjects received scapular mobilization and scapular Proprioceptive neuromuscular facilitation (PNF). whereas Group-B subjects received scapular mobilization. The outcome measures used were Numerical Pain Rating Scale (NPRS) and Shoulder Pain and Disability Index (SPADI) and were measured pre-treatment, and at the 4th week of treatment. The study was conducted over a period for 6 months.

Results: The results showed that there is significant improvement was obtained in Numerical Pain Rating Scale (Pre test-8.33 and Post test-4.83) and Shoulder Pain And Disability Index (Pre test-74.67 and Post test-39.44) of Group A. Which is statistically significant (P value<0.05).

Conclusion: The study concludes that Scapular Mobilization and Scapular PNF was more effective in decreasing pain and disability in adhesive capsulitis subjects.

Keywords: Adhesive capsulitis, scapular mobilization, scapular PNF, Numerical Pain Rating Scale, Shoulder Pain And Disability Index.

I. INTRODUCTION

Adhesive capsulitis, an idiopathic condition, is characterized by fibrosis, a decrease in the volume of the glenoid capsule, and increasing pain, accompanied by a reduction in both passive and active range of motion (ROM). It was Codman who originally used the phrase "frozen shoulder." Then, Neviasser referred to it as adhesive capsulitis.[1] Adhesive capsulitis

affects 2-5% of people in the general population and 10–20% of people with diabetes. Patients with hyperthyroidism and hypertriglyceridemia have been found to have a higher incidence of frozen shoulder.[2] The incidence is higher in females than in males, and it often happens between the ages of 40 and 60. Typically, shoulder movement exacerbates pain, whereas rest relieves it. At night, pain can worsen and interfere with sleep. Daily living activities become challenging, especially those that call for reaching across the body, overhead, or behind the back. As symptoms worsen, patients find it harder and harder to find comfortable arm postures. The muscles surrounding the shoulder joint, especially the glenohumeral internal rotators and flexors, may become weaker. Regarding the shoulder, Cyriax suggested that abduction would be more constrained than internal rotation, while external rotation would be more constrained.[1] A social and economic burden results from the common impairment of functional capacities, including everyday living and professional tasks, as well as quality of life.[3] Although the precise underlying aetiology of adhesive capsulitis is uncertain, females and the non-dominant hand are thought to be more susceptible.[4] A widespread inflammatory response accompanied by high cytokine levels that ultimately causes the glenohumeral joint capsule to scar, causing discomfort, stiffness, and a reduction in quality of life.[5] There are two distinct types of adhesive capsulitis: primary and secondary. It is possible for primary (or idiopathic) adhesive capsulitis to develop on its own without any particular trauma or trigger. Following periarticular fracture dislocation of the glenohumeral joint or other severe articular trauma, secondary adhesive capsulitis is frequently seen.[6] Three stages are typically recognized for adhesive capsulitis: (1) The painful stage, which lasts two to nine months, is marked by a progressive onset of mild to severe pain and a slight limitation of range of motion (ROM). (2) The stiff stage, which lasts for four to twelve months and is characterized by a considerable loss of active and passive range of motion and a decline in discomfort. (3) The thawing stage, which lasts between five and twenty-six months and is characterized by spontaneous recovery.[7] The most important muscles in controlling dynamic stability and arthrokinematics are the rotator cuff muscles of the shoulder. The most biomechanically active shoulder muscle is the supraspinatus, which plays a more significant function. However, compared to other muscles, those with inadequate blood flow are more likely to degenerate. Research has shown that damage to the supraspinatus muscle directly affects the shoulder joint's arthrokinematics and can, depending on the extent of the injury, totally impede joint movement.[8] The condition known as adhesive capsulitis occurs when the connective tissue that surrounds the shoulder's glenohumeral joint, known as the shoulder capsule, becomes inflamed and tight, significantly limiting range of motion and producing persistent pain. The troublesome shoulder may be limited or immobilized selectively as a result of adhesive capsulitis pain. Reduced collagen length, fibro-fatty infiltration into the capsular recess, ligament atrophy leading to reduced stress absorption, collagen band bridging across recesses, random collagen production, and altered sarcomere number in muscle tissue are some of the harmful Patho-physiologic findings that have been demonstrated to occur when a joint is immobilized for an extended period of time.[9] A number of problems are also associated with Adhesive capsulitis, such as humeral fracture, bicep tendon rupture during manipulation, and lingering discomfort and stiffness. Medical history, imaging, and physical examination are some of the components that go into a clinical diagnosis of Adhesive capsulitis.[10] Conservative methods, particularly supervised and unsupervised rehabilitation, injections, and, in rare cases, surgery when conservative measures are ineffective, form the conventional care of Adhesive capsulitis.[11] Instead of waiting for a natural recovery, a variety of therapies are employed to decrease discomfort and improve range of motion more quickly. Surgical interventions include arthroscopic capsular release, synovectomy, and manipulation under anaesthesia. However, surgical procedures must be recommended in instances that are not responsive to conservative treatment because they can result in problems such as fractures, glenoid and labral injuries, neuropraxia, and rotator cuff pathology.[12] Active and passive range of motion (ROM) exercises, proprioceptive neuromuscular facilitation (PNF) techniques, ultrasound, interferential therapy, heat or ice applications, physical therapy treatment methods, and mobilization techniques are the most effective.[13] Proprioceptive neuromuscular facilitation is a therapeutic approach that improves range of motion and muscle activation through four theoretical mechanisms: (1). Autogenic inhibition. (2). Reciprocal inhibition. (3). Stress relaxation, and (4). The gate control hypothesis. It has been shown that proprioceptive neuromuscular stimulation is useful for enhancing functional capacities and reducing pain. The greatest potential for muscle functioning is offered by proprioceptive neuromuscular facilitation techniques, especially those that involve reciprocal activation of the agonist and antagonist to the desired motion. [14] A low-velocity, small or large-amplitude movement applied anywhere within a joint's range of motion is called mobilization.[15] By stretching tight soft tissues and restoring normal shoulder capsule extensibility, joint mobilization treatments increase shoulder function and range of motion while lowering pain. By releasing muscles and breaking adhesions, scapula mobilization can increase scapular motions. Increased scapular motions may also be associated with improved shoulder movement.[16] The most popular forms of exercises included in a multimodal program were wand/wall exercises, muscle

energy techniques (proprioceptive neuromuscular facilitation), stretching exercises, isometric or strengthening exercises for the rotator cuff, trapezius, scapular, and glenohumeral muscles, and (Codman) pendulum exercises.[17] Several self-report instruments for assessing pain intensity have been created specifically for children and adolescents, with the 0 to 10 Numerical Rating Scale (NRS-11) being one of the most frequently utilized tools. The NRS-11 has undergone comprehensive examination in studies involving adults.[18] The SPADI is designed to assess pain and activity limitations associated with shoulder disorders, consisting of a 5-item pain subscale and an 8-item disability subscale.[19]

II. METHODOLOGY

STUDY DESIGN

The study design was a pre-test and post- test experimental study design.

STUDY SETTING

The study was conducted at K.G Physiotherapy and Rehabilitation Centre, K.G College of Physiotherapy, Saravanampatti, Coimbatore under the supervision of my guide.

STUDY DURATION

The study was conducted over a period of six months. Each patient underwent treatment session of 3 times per week and a period of 4 weeks.

STUDY POPULATION:

The study population was adhesive capsulitis patients.

STUDY SAMPLING

By purposive sampling, 18 patients with adhesive capsulitis were selected according to inclusive and exclusive criteria and divided into 2 groups, 9 in each group. Groups are named as Group A and Group B.

CRITERIA FOR SELECTION:

Inclusion Criteria was adhesive capsulitis at the freezing stage, Movement constraint due to the capsule, Adhesive capsulitis that is unilateral, People between the ages of 40 and 60, both men and women, A case of a patient exhibiting both primary and secondary adhesive capsulitis has been identified. Exclusion Criteria was recent dislocations or fractures in the afflicted shoulder complex, Shoulder joint pathologies besides adhesive capsulitis, A neurological impairment that impairs shoulder function during day-to-day activities, A history of shoulder surgery or manipulation performed under anaesthesia, as well as the administration of a local corticosteroid injection to the afflicted shoulder during the previous three months, Individuals with metal shoulder implants.

PROCEDURE:

18 patients were divided into 2 groups, each group consisted of 9 patients. Group A were given scapular proprioceptive neuromuscular facilitation and scapular mobilization with paraffin wax therapy. Group B were given Scapular mobilization with paraffin wax bath.

SCAPULAR PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION:

In the PNF group, a skilled therapist administered scapular PNF in two diagonals: anterior elevation and posterior depression, and posterior elevation and anterior depression, each including 20 repetitions.

SCAPULAR MOBILIZATION:

The scapular superior and inferior glides, as well as the scapular upward and downward rotations and distractions, are all part of scapular mobilizations. For four weeks, there were three sessions per week, each consisting of three sets of ten repetitions with a 30-seconds rest period in between.

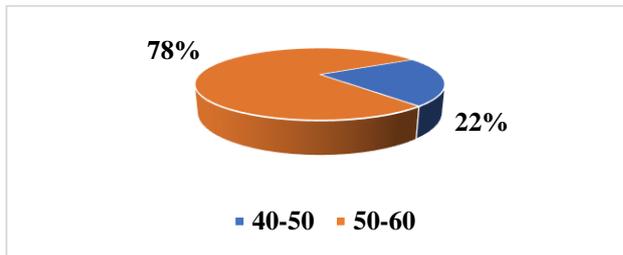
PARAFFIN WAX THERAPY:

The wax therapy wrapping approach for 8–10 minutes while keeping the temperature between 40° and 45° Celsius before to the activity. The shoulder was treated using wax therapy.

III. DATA ANALYSIS AND INTERPRETATION

Age group classification:

S.NO	AGE RANGE	PERCENTAGE	MEMBERS
1.	40-50	22 %	4
2.	50-60	78%	14
TOTAL			18



GENDER CLASSIFICATION

S.NO	GENDER	MEMBERS
1.	MALE	6
2.	FEMALE	12
TOTAL		18

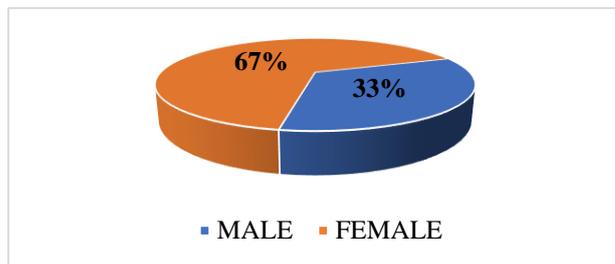
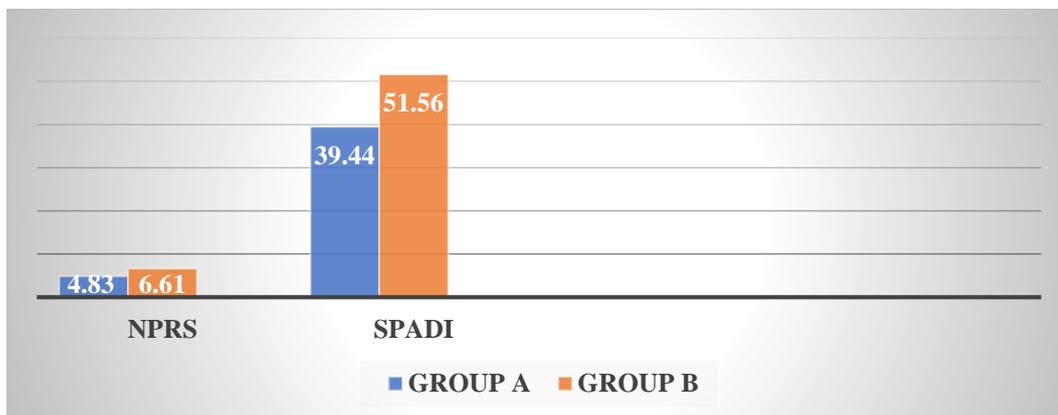


TABLE III: SHOWS DESCRIPTIVE ANALYSIS OF NUMERICAL PAIN RATING SCALE AND SHOULDER PAIN AND DISABILITY INDEX:

PARAMETER	TEST	MEAN ± SD	TABLE T VALUE	P VALUE
NPRS GROUP A	POST TEST	4.83 ± 0.14	1.746	0.05
NPRS GROUP B	POST TEST	6.61 ± 0.16		
SPADI GROUP A	POST TEST	39.44 ± 1.12	1.746	0.05
SPADI GROUP B	POST TEST	51.56 ± 0.9		

TABLE III shows the analysis of numerical pain rating scale between Group A and Group B. Using unpaired ‘t’ test with 16 degree of freedom and 0.05% as a level of significance, the calculated ‘t’ value is 8.19436, which was greater than the tabulated ‘t’ value or critical value is 1.746. the result shows that there was marked difference between group A and group B values. Group A shows clinical significance than the group B. For Shoulder pain and disability index between Group A and Group B. Using unpaired ‘t’ test with 16 degree of freedom and 0.05 as a level of significance, the calculated ‘t’ value is 8.43, which was greater than the tabulated ‘t’ value or critical value is 1.746. the result shows that there was marked difference between group A and group B values. Group A shows clinical significance than the group B.



IV. DISCUSSION

The purpose of this study was to compare the effect of Scapular Proprioceptive Neuromuscular Facilitation and Scapular Mobilization Versus Scapular mobilization alone on pain and disability among patients with adhesive capsulitis. In this study based on selection criteria 18 patients were selected and they were divided into 2 groups. The groups were named as Group A and Group B. Each group consisted of 9 patients. They were selected randomly to each group. 9 patients of Group A underwent Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization along with Paraffin wax bath. 9 patients of Group B underwent Scapular mobilization along with Paraffin wax bath. After pre test assessment patients undergone 4 weeks of treatment using Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization along with Paraffin wax bath in Group A and Scapular mobilization along with Paraffin wax bath in Group B. For the purpose of statistical analysis, the Student's 't' test was utilized. Unpaired 't' test showed that there was a significant difference between the effect of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization Versus Scapular mobilization alone on pain and disability among patients with adhesive capsulitis. Paired 't' test concluded that there was a significant effect of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization along with Paraffin wax bath in reduction of pain and disability among patients with adhesive capsulitis, which was supported by studies as follows. The discomfort encountered by individuals with adhesive capsulitis (AC) is linked to the development of inflammation that progresses to fibrosis, such as that observed in the subacromial bursa. The source of this pain is rooted in inflammation and the associated inflammatory response. This process encompasses the activation of pain receptors, the transmission and modulation of pain signals, neuroplasticity, and central sensitization, all of which represent a continuous spectrum of the inflammatory response. [42] The shoulder joint is closely associated with scapular movement, and the application of Proprioceptive Neuromuscular Facilitation (PNF) techniques has demonstrated significant benefits in the treatment of Adhesive Capsulitis. Incorporating PNF treatment strategies into the management plan for Adhesive Capsulitis may lead to improved outcomes, including pain reduction and enhanced shoulder function. The effectiveness of the scapular PNF hold-relax technique, a component of proprioceptive neuromuscular facilitation, has been shown to positively influence key outcomes such as range of motion (ROM) and pain levels in patients suffering from Adhesive Capsulitis. Overall, the scapular PNF hold-relax technique is a valuable approach in addressing essential outcomes associated with shoulder Adhesive Capsulitis. [43] Scapular mobilization demonstrated superior outcomes compared to traditional treatment methods in terms of pain alleviation, enhanced shoulder abduction, and improved external rotation range of motion, as well as consistent scoring results. This technique facilitates tissue stretching and promotes the reorganization of connective tissue, extracellular matrix, and collagen structures, thereby enabling tissue remodeling that enhances tensile loading capacity. [16] Paraffin wax therapy is commonly employed to enhance blood circulation through vasodilation. This process results in an increased supply of oxygen and nutrients to the tissues, while also improving the flexibility of tendons and collagen fibers. Furthermore, it alleviates chronic inflammation, pain, and joint stiffness by diminishing inflammatory exudates. [34] Paired 't' test concluded that there was a significant effect of Scapular mobilization along with Paraffin wax bath in reduction of pain and disability among patients with adhesive capsulitis, which was supported by studies as follows. The findings indicated that end range mobilization and scapular mobilization techniques are considerably more effective than passive stretching exercises in alleviating shoulder pain severity, enhancing functional ability, and increasing the range of motion in shoulder flexion and abduction. Mobilization may facilitate the alignment of collagen fibers, enhance the balance of glycosaminoglycans and water content in the tissue, reduce adhesion formation, improve tensile properties, and stimulate collagen turnover. Furthermore, these alterations are believed to support the healing process, ultimately leading to an increased range of motion and restoration of function. [27] Paraffin wax is commonly employed to enhance blood circulation and promote relaxation. The origin of pain is often multifaceted, potentially involving the accumulation of toxic metabolites, muscle spasms, inflammation, and psychological influences. Wax therapy typically aids in alleviating discomfort and fostering relaxation, which can positively influence the emotional response to pain and further diminish muscle spasms. [34] In unpaired 't' test, there was a significant difference between the effect of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization Versus Scapular mobilization alone on pain and disability among patients with adhesive capsulitis. In cases of adhesive capsulitis, scapular mobilization and scapular Proprioceptive neuromuscular facilitation are crucial for decreasing disability and reducing pain. A paraffin wax bath is typically used to encourage relaxation and increase circulation. This study concluded that of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization along with paraffin wax therapy is more effective on decreasing pain and disability among patients with adhesive capsulitis. Clinical implication: The implication of the study is that Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization is more effective than Scapular mobilization alone on pain and disability among patients with adhesive capsulitis.

V. CONCLUSION

The aim of this study was to compare the effect of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization Versus Scapular mobilization on pain and disability among patients with adhesive capsulitis. 18 patients with adhesive capsulitis who fulfilled the predetermined inclusive and exclusive criteria were selected and divided into two groups, 9 in each group. Group A underwent Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization along with Paraffin wax bath. Group B underwent Scapular mobilization along with Paraffin wax bath. Pain and disability was measured using Shoulder Pain and Disability Index (SPADI) and Intensity of pain was measured by Numerical Pain Rating Scale (NPRS). The values of outcome measures were recorded before the beginning of treatment regime day 1 and at the end of 4th week. Statistical analysis was done using Student's 't' test. Paired 't' test was used to find out the improvements within the group. Unpaired 't' test was used to find out the difference between two groups. The results showed that there was a significant difference between the effect of Scapular proprioceptive neuromuscular facilitation and Scapular Mobilization Versus Scapular mobilization alone on pain and disability among patients with adhesive capsulitis.

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