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Impact of PNF, Active Release Technique and Conventional Physiotherapy on the physical ability of subjects with Periarthritis Shoulder

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ABSTRACT

The term Periarthritis and adhesive capsulitis was coined in 1945 by Neviaser. The exact etiology remains unclear. The presentation is like an inflammatory condition followed by fibrosis and collagen deposition. Periarthritis (PA) is a "catch-all diagnosis" that frequently refers to a variety of shoulder issues. The goal of this study was to see how Neuromuscular Facilitation and Active Release Technique improves pain, range of motion, and shoulder function in periarthritic patients. Based on the criteria for selection, the investigation was carried out at the ACS Medical College and Hospital's Outpatient Department of Physiotherapy. They were divided into Group A (n = 12), Group B (n = 12) and Group C (n = 12) using the simple random lottery procedure. This study used a pre- and post-test comparison design. Simple random sampling was used to choose the study's 36 participants, who were both male and female, aged 40 to 60, with second-stage periarthritis of the shoulder. Pre- and post-test scores were kept for the outcome measure, which included the Visual Analog Scale, Goniometry, Shoulder Pain and Disability Index Scale. Six weekly sessions of the treatment were given over the course of four weeks. The Dependent variable is Pain, ROM, shoulder function, the Independent variables are Neuromuscular Facilitation and Active Release Technique. The present study provided evidence to prove that proprioceptive neuromuscular facilitation is more effective than the active release technique with $P<0.001$, in periarthritic patients in terms of lowering discomfort, enhancing range of motion, and functional capacity. According to the study, periarthritic individuals who underwent the proprioceptive neuromuscular facilitation have pain relief, improved range of motion, and improved functional abilities.

Keywords: *Periarthritis; Adhesive capsulitis; SPADI; Active release technique; PNF*

INTRODUCTION

Adhesive capsulitis (AC) was initially identified in 1872 as periarthriti scapulohumerale and then in 1934 as frozen shoulder. It is a typical musculoskeletal condition.[1] That affects the glenohumeral joint and characterized by escalating joint capsule inflammation and ensuing shoulder stiffness. Because the frozen shoulder is incapacitating and frequently causes such intense pain, patients often find it difficult to cope. The prevalence of AC is about 4% in the general population, but it can affect up to 36% of diabetic patients. Usually between the 5th and 7th seventh decade of life, female patients are most frequently affected. There are two types of frozen shoulder: primary (idiopathic) cases and secondary cases. Primary frozen shoulder's etiology is still unknown. The symptoms in the first group appear gradually and develop slowly, and there is no clear trigger mechanism. Secondary cases typically result from trauma or prolonged immobility, which may be caused by a variety of pathologies [2]

"Freezing, frozen, and thawing" are the three phases that are typically experienced as frozen shoulder progresses. A gradual preliminary onset over days or weeks characterizes these stages, which last for about two years. It takes about three months to get through phase (freezing), which is characterized by intense pain. A significant amount of stiffness and pain at the limits of movement characterize the frozen (adhesive) phase, which lasts for 3–9 months. The thawing (resolution) phase, which lasts 9–18 months and is comparatively painless, sees a steady improvement in stiffness. Frozen shoulder is a self-limiting condition that goes away in 12 to 36 months, according to several authors. [3]

Adhesive Capsulitis can be treated surgically or conservatively. Studies have also shown that rehabilitation is highly effective in enhancing ROM, reducing pain, and enhancing function. Early in the 1950s, Kabat and Knott developed the PNF treatment method. The general exercises are carried out as typical physiological joint movements in one plane, such as abduction, rotation, or flexion. PNF aims to improve joint coordination, movement control, and mobility. This can be accomplished by rotating diagonal movement patterns in response to a variety of stimuli while following the therapist's instructions. All PNF techniques are carried out in accordance with fundamental guidelines, and performing rotational patterns of movement is one of their key elements. To increase muscle strength and flexibility, various techniques can be used, including rhythmic initiation, repeated contractions, rhythmic stabilization, combinations of isotonics, dynamic reversals, hold-relax, and contract-relax. The neurophysiology of reciprocal innervation, post-isometric relaxation (autogenic inhibition),and stress-relaxation is the foundation for hold-relax,contract-relax techniques[4]

Stretching and strengthening exercises, electrotherapy modalities, or mobilisation may be used in conjunction with physiotherapy treatment. Among a wide range of exercises, joint mobilisation is a type of passive movement used to treat sore and stiff synovial joints. There are various types of mobilisation, and terminology varies between authorities. The oscillatory motions will be in the direction of the accessory motions of the joint, which are minute rolling, gliding, spinning, or distracting motions that take place between joint surfaces and are necessary for normal mobility. Movement of the humeral head inferiorly as it moves on the glenoid fossa during normal abduction is an example of an accessory motion at the shoulder. For the larger tuberosity of the humerus to pass beneath the coracoacromial arch and enable complete arm elevation, this gliding action is required. When an examiner moves one articular surface passively while stabilising the other, accessory movements in healthy synovial joints can be seen. [5]

Active release technique is also one of the treatment options considered now a days by many health practitioners for the treatment of frozen shoulder. Active release technique helps to break the adhesions formed around the shoulder joint. It also releases and stretches the connective tissue around the shoulder, restores vascular and lymphatic circulation, and increases the range of motion [6]. Dierks et al described a prospective study of 77 patients that compared exercise within the limits of pain with intensive physiotherapy in patients with frozen shoulder.

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They found better results with exercise performed within the limits of pain (64% reached near normal, painless shoulder movements at 12 months and 89% at 24 months) than with intensive physiotherapy (63% achieved a similar result at 24 months).[7]

Many conditions can cause symptoms similar to those of adhesive capsulitis, including full- and partial-thickness rotator cuff tears, calcific tendinitis, glenohumeral or acromioclavicular arthritis, and cervical radiculopathy. -An accurate diagnosis of adhesive capsulitis can reduce patient morbidity by shortening pain duration through physical therapy and intra-articular steroid injections. Radiologic findings could play an important role in adhesive capsulitis diagnosis during the early stages or when clinical features are atypical. In this regard, characteristic ultrasound findings and cutoff values for adhesive capsulitis parameters could be useful for creating a differential diagnosis between adhesive capsulitis and other diseases that mimic adhesive capsulitis. The natural course of adhesive capsulitis can be divided into 4 stages based on clinical presentation and arthroscopic appearance: pre freezing, freezing, frozen, and thawing [8]

METHOD AND MATERIAL

The present randomised control trial study was carried out with the approval of the Institutional Review of ACS Medical College and Hospital, Velappanchavadi, Chennai, India. This was a comparative study with pre- and post-testing. The study included 36 subjects with periarthritis shoulder who met the inclusion criteria: clinically diagnosed case of periarthritis shoulder (second stage), both male and female, age group 40-60 years, and both dominant and non-dominant hand. Any recent shoulder joint surgery, pacemakers, or other medical conditions should be disclosed. Subjects on medications, recent steroid injection around shoulder joint Biceps tendinitis and other intrinsic shoulder diseases, Parkinsonism, rotator cuff tears Rheumatoid arthritis, cervical radiculopathy was ruled out of the study. .

Based on inclusion and exclusion criteria, the study was carried out at the ACS Medical College and hospital's Outpatient Department of Physiotherapy. Participants were divided into Group A (n-12), Group B (n-12) and Group C (n-12) using the simple random lottery method. From the patient, comprehensive demographic information and past medical history were gathered. Informed consent was gained once the treatment process was thoroughly explained. Before and after the therapy, the outcome measure, which included the Visual Analog Scale, Goniometry, Shoulder Pain and Disability Index Scale, was recorded as a pre- and post-test score. Six sessions per week for two weeks were used for the treatment. Pain, range of motion, and shoulder function are the dependent factors. Neuromuscular Facilitation, and Active Release Technique are the independent variables. Neuromuscular Facilitation was applied to Group A, Active Release Technique to Group B, and Conventional Exercise to Group C.

Group A (Neuromuscular Facilitation): Scapular PNF was applied to the PNF group by a professional therapist in two diagonals, anterior elevation and posterior depression and anterior elevation and posterior depression, each with 20 repetitions. While therapists stood in the direction of the desired motion, patients were lying on their unaffected side. The therapist started off by giving instructions in advance. Before giving instructions for the intended action, the therapist pushed the scapula to an extended position at the beginning of the pattern. All of the patterns employed rhythmic initiation and facilitation techniques that involved repeated contractions. The best PNF agonistic technique for scapular facilitation is this method. The patient's motion is normalised by the rhythmic initiation technique, which also relaxes the patient, improves coordination, and teaches the patient's motion. Utilizing a series of contractions, the patient's motion is directed in the desired direction and their active range of motion and strength are improved. A 20 second rest period was included in between each repetition.

Group B (Active Release Technique)

The humerus was abducted to 45 degrees, the elbow was externally rotated (20–25 degrees) to the midline, and the flexion was at 90 degrees when the subjects were positioned supine. The muscle in the axilla was palpated in order to identify any areas that had taught bands, trigger points, or myofascial mobility restriction. The therapist carefully places their palm in the lower axilla of the patient, close to the latissimus dorsi muscle mass.

The therapist presses on the muscle while feeling for trigger points or localised tenderness and triggering referred pain. The therapist will actively abduct the subject's shoulder while releasing the trigger point with the thumb and holding the elbow using the other hand. During ART, a particular muscle is shifted from a shortened to a lengthened position, or vice versa. The procedure lasted between eight and fifteen minutes.

Group C (Conventional exercises)

Exercises for the shoulder that are commonly performed include the thumb ladder, wand exercise, mariner's wheel and codman's pendular exercise.

Data Analysis and Interpretation

TABLE 1: Comparison of VAS score between Group A, B, C using Analysis of Variance
*p>0.05(NS), **p<0.05

Groups	**Pre Test**		**Post Test**	
	MEAN	SD		MEAN
GROUP A	6.41	.514	2.91	.514
GROUP B	6.50	.522	3.75	.753
GROUP C	6.50	.522	4.08	.900
F VALUE	.103	.103	17.79	17.79
SIGNIFICANCE	.958*	.958*	.000**	.000**

When the post-test mean VAS scores for the various groups (Group A(PNF), Group B(ART), Group C(CV),Group A(PNF) 2.91 showed higher significance than Group B(ART) 3.75, the difference between the two groups was significant. The post-test mean VAS score values showed that Group A (PNF) fared better than Group B (ART), which scored 3.75. Group B(ART) 3.75 outscored Group C(CV) 4.08 in terms of post-test mean VAS score comparisons.

TABLE 2: Comparison of SPADI score between Group A, B, C using Analysis of Variance

Groups	**Pre Test**		**Post Test**	
	MEAN	SD	MEAN	SD
GROUP A	70.33	4.43	36.16	2.58
GROUP B	69.08	3.55	48.91	4.79
GROUP C	68.08	2.53	60.01	3.47
F VALUE	.929	.929	187.36	187.36
SIGNIFICANCE	.435*	.435*	.000**	.000**

*p>0.05(NS), **p<0.05

Comparing the post test mean values of SPADI score between Group A(PNF), Group B(ART), Group C(CV), Group A (PNF) 36.16 revealed better significance than Group B(ART) 48.91.

On comparing the post test mean values of SPADI score between Group B(ART) 48.91 has shown better results than Group C(CV) 60.01

TABLE 3: Comparison of ROM (ABDUCTION) score between Group A, B, C using Analysis of Variance

Group	**Pre Test**		**Post Test**	
	MEAN	SD		MEAN
GROUP A	83.16	6.99	122.91	6.31
GROUP B	82.25	5.20	100.66	5.10
GROUP C	84.16	12.93	97.33	5.95
F VALUE	.063	.063	95.89	95.89
SIGNIFICANCE	.959*	.959*	.000**	.000**

*p>0.05(NS), **p<0.05

The post test mean values of ROM (ABDUCTION) score between Group A (PNF), Group B(ART), Group C(CV), Group A(PNF) 122.91 has shown better significance than Group B(ART) 100.66.

The post test mean values of ROM (ABDUCTION) score between Group B(ART) 100.66 has shown better results than Group C (CV) 97.33

TABLE 4: Comparison of ROM (INTERNAL ROTATION) score between Group A, B, C using Analysis of Variance

Groups	**Pre Test**		**Post Test**	
	MEAN	SD		MEAN
GROUP A	35.41	8.00	56.83	8.07
GROUP B	36.58	5.36	48.75	5.98
GROUP C	37.00	4.80	44.16	4.80
F VALUE	.146	.146	17.00	17.00
SIGNIFICANCE	.932*	.932*	.000**	.000**

*p>0.05(NS), **p<0.05

On comparing the post test mean values of ROM (Internal Rotation) score between Group A (PNF), Group B (ART), Group C (CV), Group A (PNF) 56.83 has shown better significance than Group B (ART) 48.75.

On comparing the post test mean values of ROM (Internal Rotation) score between Group B (ART) 48.75 has shown better results than Group C (CV) 44.16

TABLE 5: Comparison of ROM (External Rotation) score between Group A, B, C using Analysis of Variance

Groups	**Pre Test**		**Post Test**	
	MEAN	SD	MEAN	SD
GROUP A	27.41	2.15	45.91	5.69
GROUP B	27.91	7.75	37.00	9.64
GROUP C	26.16	5.50	32.58	5.79
F VALUE	.569	.569	24.72	24.72
SIGNIFICANCE	.638*	.638*	.000**	.000**

*p>0.05(NS), **p<0.05

On comparing the post test mean values of ROM (External Rotation) score between Group A (PNF), Group B (ART), Group C (CV), Group A (PNF) 45.91 has shown better significance than Group B (ART) 37.00.

On comparing the post test mean values of ROM (External Rotation) score between Group B (ART) 37.00 has shown better results than Group C (CV) 32.

RESULT

When the post-test mean VAS values of the different groups were compared, Group A (PNF) demonstrated a significantly greater improvement than Group B(ART), and Group C(CV) at p0.05.

When the post-test mean SPADI values of the different groups were compared, Group A (PNF) demonstrated a significantly greater improvement than Group B(ART), and Group C(CV) at p0.05.

Group A (PNF) shown a significantly greater improvement than Group B(ART), and Group C(CV) at p0.05 when comparing the post-test mean values of ROM(Abduction) between groups.

Group A (PNF) significantly outperformed Group B(ART), and Group C(CV) in terms of post-test mean values of ROM (Internal rotation), with a p-value of 0.05.

DISCUSSION

The aim of the study was to compare the impact of various physiotherapy modalities on shoulder function in individuals with periarthritis. The mean and standard deviation values of the pre- and post-test scores of the VAS, SPADI, and ROM (flexion, abduction, internal rotation, and external rotation) were computed, and they showed an improvement in terms of lowering pain, improving range of motion, and increasing ability in three groups. When the results from the three groups were compared, it became clear from the study's findings that neuromuscular facilitation outperformed active release technique, and standard exercise.

Both Groups had notable differences and post-treatment gains, according to Narayan, Anupamaet al. With lower SPADI scores, Group A of the experimental group performs better than Group B of the control group, which suggests that there is a substantial difference between the post-test scores of the two groups. Conclusion: When treating adhesive capsulitis, the neuromuscular facilitation has a significant positive impact on the shoulder's functional capacity. Sami S. Almureef et al. came to the conclusion that combining a mobilisation programme with traditional therapy for treating frozen shoulder can be more effective at restoring shoulder range of motion and lowering pain[5]. Michael.G.Mertens et al. came to the conclusion that ROM, function, and pain can all be improved with exercises alone or in combination with other programmes, but that there is little to no difference between the two for ROM and pain and that the data for function is conflicting.[11]. According to Neeti Mishra et al., combining traditional physical therapy exercises with scapular proprioceptive neuromuscular facilitation helps patients with adhesive capsulitis experience less discomfort and disability[12]. In order to improve range of motion (ROM) in chronic PA shoulders, Manobhiram nellutla et al. came to the conclusion that PNF movement pattern exhibits greater results[13]. End range mobilisation is more effective in lowering pain with improvements in joint range and functional performance, according to Anitha, J. Sridevi, and colleagues[14]

PNF, traditional exercise, and physiotherapy modalities all demonstrated immediate effects on adhesive capsulitis, according to Nilay comuk [15]

CONCLUSION

The current study provided proof that proprioceptive neuromuscular facilitation is superior to active release technique, and conventional treatment for periarthritic patients in minimizing pain, enhancing range of motion, and improving functional capacity.

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Ethical clearance

Institutional ethical clearance has been obtained from ACS Medical College and hospital, Chennai to conduct this study.

Conflict of Interest

There is no conflict of interest to conduct and publish this study

Fund for the study

The fund for the study was taken by the researcher

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