A COMPARATIVE STUDY TO EVALUATE EFFECTIVENESS OF MOVEMENT WITH MOBILIZATION VERSUS KIASTM AND DYNAMICEXERCISES PROGRAMME IN DIABETIC CHRONIC FROZEN SHOULDER

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ABSTRACT

BACKGROUND: In 1934, Codman coined the phrase "frozen shoulder" to characterise a person who presented with a severe loss of shoulder mobility and normal radiological findings. Medical terminology for frozen shoulder is sticky capsulate. The connective tissue illness known as frozen shoulder, which restricts the shoulder's natural range of motion in people with diabetes, is considered to be brought on by long-term hypoglycemia, which alters the collagen in the shoulder joint. Although it can happen in both shoulders, it typically only affects one. Traditional classifications of adhesive capsulitis include primary (idiopathic) and secondary (resulting from an underlying condition). It might not occur as frequently as believed as a primary, isolated entity. The focus of the orthopedic literature is on the diagnosis and management of concurrent To compare the effectiveness of movement with mobilization (MWM) Versus KIASTM with dynamic exercise programmed in diabetic chronic frozen shoulder. conditions, such as diabetes mellitus, rotator cuff tendinopathy or tear, subacromial bursitis, biceps tendinopathy, recent shoulder surgery or trauma, and inflammatory diseases. To assess the effectiveness of KIASTM and dynamic exercise in diabetic chronic frozen shoulder. To assess the effects of mobility with mobilization in diabetic chronic frozen shoulder.To assess the efficacy of dynamic exercise, KIASTM, and movement with mobilization in treating diabetic chronic frozen shoulder.

METHODOLOGY:

Comparative study design. patients diagnosed with chronic frozen shoulder. were randomly selected according to inclusion and exclusion criteria and were divided into two groups – Group A: movement with mobilization and conventional exercises, Group B: KIASTM with dynamic exercise and conventional exercises programme. Duration of Study: 30 minutes per day, 4days in a week, total 12 Weeks

CONCLUSION : This study concludes that both movement with mobilization (MWM) and KIASTM with dynamic exercises program having significant effects in diabetic chronic frozen

shoulder but comparatively KIASTM with dynamic exercises program is more effective than Movement with mobilization (MWM) techniques while statistically comparing. P value of both groups ($P < 0.05$)

INTRODUCTION

Frozen shoulder was first termed by Codman in 1934, described a person presenting With painful loss of shoulder motion with normal radiology studies. Frozen shoulder, medically referred to as adhesive capsulate. Frozen shoulder is disorder of the connective tissue that limits the normal range of motion of the shoulder in diabetes,frozen shoulder is thought to becaused by changes to the collagen in the shoulder joint as a result of long term hypoglycemia. It usually in one shoulder only although it can occur in both[2,3]

Adhesive capsulitis has traditionally been characterized as primary (idiopathic), or secondary (resulting from an underlying condition). Its incidence as a primary, isolated entity may not be as high as previously thought. The orthopedic literature emphasizes diagnosis and treatment of concomitant conditions, such as diabetes mellitus, rotator cuff tendinopathy or tear, subacromial bursitis, biceps tendinopathy, recent shoulder surgery ortrauma, and inflammatory diseases.[5-6]

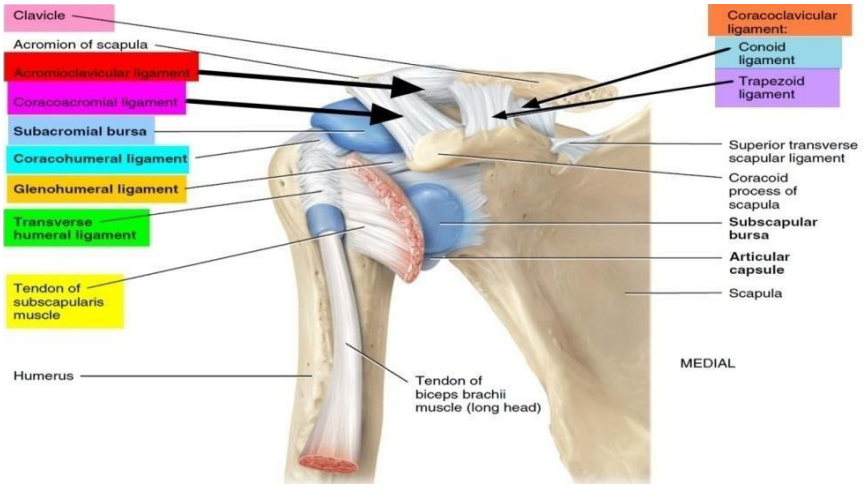


Fig: Shoulder joint anatomy

The incidence of adhesive capsulitis is approximately 3 percent in the general population.[7,8] It israre in children,[9] and peaks between 40 and 70 years of age.[8] Women are more often affected than men, but there is no known genetic or racial predilection. It is common in persons with insulin dependent and non-insulin-dependent diabetes, and in those with prediabetes (glucose-intolerance).[7,8]

Persons with a history of adhesive capsulitis are at increased risk of developing the conditionon the contralateral side. Recurrence on the affected side is also possible, especially in patients with diabetes.

Adhesive capsulitis has been described as having three sequential phases: a painful stage, a freezing stage, and a thawing or recovery stage. There is, however, no evidence to validate this classification, and its clinical utility is questionable. Pain and limited range of motion can occur in all phases of adhesive capsulitis, which often does not follow a stepwise course. Painand decreased range of motion can persist for one to two years,[11-12] and up to 10 percent of patients never recover full range of motion. However, this loss of motion is seldom functionally limiting.[13]

Adhesive capsulitis is generally a clinical diagnosis and normally does not require extensive investigations. Plain radiographs of the shoulder to exclude osteoarthritis of the joint or other pathology are usually sufficient. Blood tests, including infection markers, are normal in true frozen shoulder [17].

Various methods of treatment are available for adhesive capsulitis which helps in maintainingand improving strength of shoulder girdle muscles and improve function[20]. It includes:

To regain the normal extensibility of the shoulder capsule and tight soft tissues, of theshoulder capsule and soft tissues by means of mobilization techniques has been recommended, but limited data supporting the use of these techniques are available.[21,22,30] mobilization with movement (MWM) techniques have been advocated by Maitland,[30] Kaltenborn,[30] and Mulligan,[37- 38] but they did not base their suggestions on research.

Kinesio Instrument Assisted Soft Tissue Mobilization (KIASTM) is a simple, non-invasiveform of manual therapy to manipulate or mobilize soft tissue structures of the human body. KIASTM is a procedure in which Accel Tool is used to mechanically stimulate soft tissue structures to relieve musculoskeletal pain and discomfort and improve overall mobility andfunction.

This therapy not only works on muscular tone, whether facilitation or inhibition, but alsoreduces the risk of injury during exercises .

This not only reduces Delayed Onset Muscle Soreness (DOMS) but also increases collagen synthesis and regeneration in oxygen deprived soft tissue structures due to exercises, improves flexibility, muscle contraction and structural proportion.

Resistive exercises typically include strengthening of the scapular s and rotatorcuff, when range of motion has progressed enough for strengtheningto be an appropriate intervention. Muscles prone to weakness in a variety of shoulder dysfunc- tions include the lower trapezius, serratus anterior, and infraspinatus. Patients with adhesive capsulitis have significantly weaker lower trapezius muscles compared to asymptomatic controls[46].

Mobilization with movement (MWM) is the concurrent application of sustained accessory mobilization applied by a therapist and an active physiological movement to end range applied by the patient. Passive end-of-range overpressure, or stretching, is then delivered without pain as a barrier.

Mulligan techniques are a kind of manual therapy for spinal or upper and lower extremity pain which use NAG (Natural Apophyseal Glide), SNAG (Sustained Natural Apophyseal Glide), or MWM (Mobilization with Movement) techniques.

Mulligan techniques do not cause patients pain and have no side effects. These techniques are also not physically intensive for therapists to practice due to their use of belts and patients' voluntary movements.Moreover, they are easy to learn, which makes them useful for clinical applications. If applied properly, they have some effect on various types of pain. However, most studies of Mulligan techniques have investigated their effect on diseases of the lumbar and thoracic regions.

Mobilization is a manual therapeutic technique that fosters movement in stagnant tissues and joints. Spinal mobilization uses massage to break down scar tissue and restrictions that are typically associated with trauma to the soft tissue such as a strained muscle or pulled ligament.

Instrument assisted soft tissue mobilization (KIASTM) is a skilled myofascial intervention used for soft-tissue treatment. It is based on the principles of James Cyriax cross-friction massage.

A proposed description for KIASTM is “a skilled intervention that includes the use of specialized tools to manipulate the skin, myofascia, muscles, and tendons by various direct compressive stroke techniques”.

The technique itself is said to have evolved from Gua sha which is a method used Chinese medicine.[4] Gua sha uses instruments with smoothed edges to scrape the

skin till red blemishes occur. However, Gua sha has different rationale, goals and application method from KIASTM.

No literature have found to compare the effectiveness movement with mobilization between KIASTM and dynamic s exercise in chronic frozen shoulder. So this study is designed to identify effectiveness of movement with mobilization between KIASTM and dynamic s exercise in chronic frozen shoulder.

The main objective of the study is to compare the effectiveness between movement with mobilization andKIASTM and dynamic exercise in diabetic chronic frozen shoulder.

METHODOLOGY

It is a comparative study in which 30 patients with chronic frozen shoulder randomly selected according to inclusion and exclusion criteria and divide into two groups – Group A: movement with mobilizationand conventional exercises, Group B: KIASTM with dynamic exercise and conventional exercises programme.

INCLUSION CRITERIA	EXCLUSION CRITERIA
a) Both Male and female patients. b) Age of 40-70 years c) Diagnosed with Type II diabetic, chronic frozen shoulder	a) Non diabetic b) Bone tumor c) Shoulder fracture d) Post traumatic e) Malignancies f) open wounds or skin infections g) tendon calcification h) osteoporosis

OUTCOME MEASURES

1. VISUAL ANALOGUE SCALE(VAS)
2. Shoulder pain and disability index (SPADI)
3. PROM (passive range of motion)

PROCEDURE

After collecting the written consent form patients were selected by inclusion and exclusion criteria and divided into two group A and group B.

Group A: treated with movement with mobilization by the use of Mulligen technique and conventional exercise: - In Mulligen technique peripheral joints combines sustained manual application of “gliding" force to a joint by the therapist while the restricted upper limb movement is performed actively or passively by the patient to restore the reduced accessory glide and the result should be a pain free movement.

Glenohumeral mobilization The head of the humerus is convex and the glenoid fossa is concave.

Loose pack position Shoulder abduction 55 degrees and horizontal adduction of 30 degrees.

Treatment plane The treatment plane is along the glenoid fossa and moves with the scapula asit moves in rotation.

Glenohumeral distraction

Indications

Distraction is usually applied during initial treatment to reduce pain and general mobility.

Position of the patient

The patient is in a supine lying position and the shoulder is in a resting position.

Hand Placement

The therapist's hand is placed in the axilla with the thumb distal to the joint margin anteriorly and fingers posteriorly. The other hand supports the lateral part of the humerus.

Mobilizing Hand

The therapist moves the hand in the axilla laterally to distract the humerus. Distraction is sustained for a few seconds..

Duration: 30 minutes per day, 4 days in a week, for 12 weeks

Figure 1 Ventral Glide with distraction (Day 1)

Figure 2 : Distraction With Movement Caudal glide (Day 1)

Figure 3 Dorsal Glide With Distraction : Day 1

Figure 4 : Ventral Glide with distraction (Day 90)

Shoulder Traction Technique (restricted flexion): Grade II/III traction was sustained for 15 seconds; repeated 10 times with a gap of 5 seconds. Shoulder Caudal Glide (restricted Abduction): Grade II/III distraction with caudal glide was given & sustained for 15 seconds; repeated 10 times with gap of 5 seconds. Shoulder Ventral Glide (for restricted external rotation): Grade II/III ventral glide was performed with shoulder in end ROM in extension & external rotation sustained for 15 seconds; repeated 10 times with gap of 5 seconds Shoulder Dorsal Glide (for restricted internal rotation): Grade II/III dorsal gliding movement to the joint was given & sustained for 15 seconds; repeated 10 times with a gap of 5 seconds

Group B treated with KIASTM with dynamic exercises and conventional exerciseprogrammed is described as :-

A) **KIASTM**: Instrument Assisted Soft Tissue Mobilization (KIASTM) is a technique which uses instruments to remove scar tissues and helps to facilitate healing in soft tissue injuries.

When KIASTM is applied to goes through 5 steps

1. Scanning
2. Combing
3. Deep combing
4. Cool down
5. Shear force

Examination : Warm-up, after warm-up is done for 10-15 (Minutes) by light jogging, elliptical machine, stationary bike or an upper body ergo meter.

KIASTM,

Done at 30-60 degrees angle for 40-120 seconds.

Stretching,

3 reps for 30 seconds

Strengthening,

High repetitions with low load exercise.

Cryo therapy, 10-20 min.

It is important to disinfect the instrument between patients to avoid transfer of infections. It is recommended to disinfect the instrument with intermediate-level disinfectants (e.g. isopropyl alcohol), then wash it with soap and water to remove any residuals of the chemical disinfectant off the instrument. If the tools contacts blood, bodily fluids, mucous membranes, or non-intact skin then disinfecting it with high-level disinfectant should be done.

B) DYNAMIC EXERCISE: Inferior glide, low Row, isometric, isotonic, eccentric, concentric. All the pre and post data of outcome measures would be kept safely for analyzing.

(12 week, 30 minute per day, 4 days in a week)

10 repetition per day

In both the groups received conventional therapy consisting of therapeutic ultrasound [Frequency: 3 MHz, Mode: Pulsed mode 1:1 Intensity: 1.2 W/cm^2 Duration: 8mins] and mobility exercise that include Codman's pendular exercise, shoulder wheel, overhead pulley, wall ladder and active exercise in all three planes. Improvement in the outcome parameters are also due to effects of conventional exercises.

DATA ANALYSIS

In present study, the two groups were compared for the significant difference to evaluate the effect of MOVEMENT WITH MOBILIZATION VERSUS KIASTM AND DYNAMIC EXERCISES PROGRAMME IN DIABETIC CHRONIC FROZEN SHOULDER. The statistical tools used for analysis were paired and unpaired "t" test. The differences between pre - test and post – test values were found. The data was collected at (0 day, at 45 days and at the end of 90thdays). The mean difference of VAS, SPADI, PROM of group A were compared with group B and the actual pattern of variation were observed. With the't' value from the pre-test and post-test, the accurate level of significance was analyzed and interpreted. An alpha level of $p<0.05$

was the level of significance for the test. Paired ‘t’ test was performed to analyze the efficacy of treatment within the groups and unpaired ‘t’ test was performed to analyze the efficacy of treatment between both groups.

PAIRED ‘t’ TEST WITHIN GROUP:

The paired ‘t’ test was used to find out the significance within the same group with thevalues of parameters considered for the study.

UNPAIRED ‘t’ TEST BETWEEN GROUP:

The ‘t’ test was used to find out the significance between the groups and itgives the valuable information regarding this study.

RESULTS

1. DEMOGRAPHIC PRESENTATION OF DATA IN GROUPS:

Thirty chronic frozen shoulder patients of age group between 40 – 70 years were randomly selected according to inclusion and exclusion criteria and divided into two groups with 15 patients in each group. Group A had a mean age of 47.0 years and Group B had a mean age of 46.93 years. The demographic data has been presented in tables and depicted in figure

DEMOGRAPHIC PRESENTATION OF DATA IN GROUPS:

GROUPS	NUMBER	AGE IN YEARS	
		MEAN±SEM	SD
Group A	15	47.0±1.41	5.47
Group B	15	46.93±1.03	3.99
Total	30	93.93±2.44	9.46

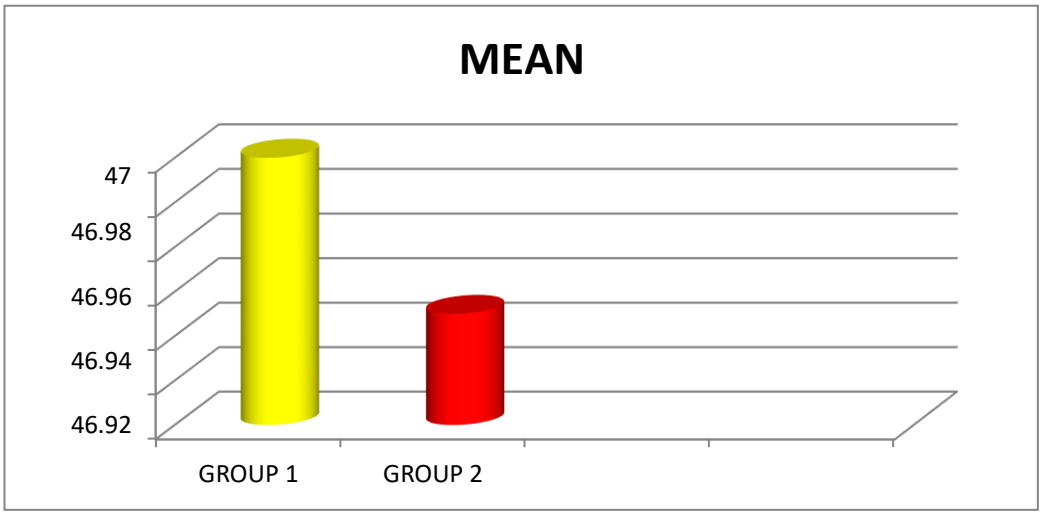

MEAN
47
46.98
46.96
46.94
46.92
GROUP 1
GROUP 2

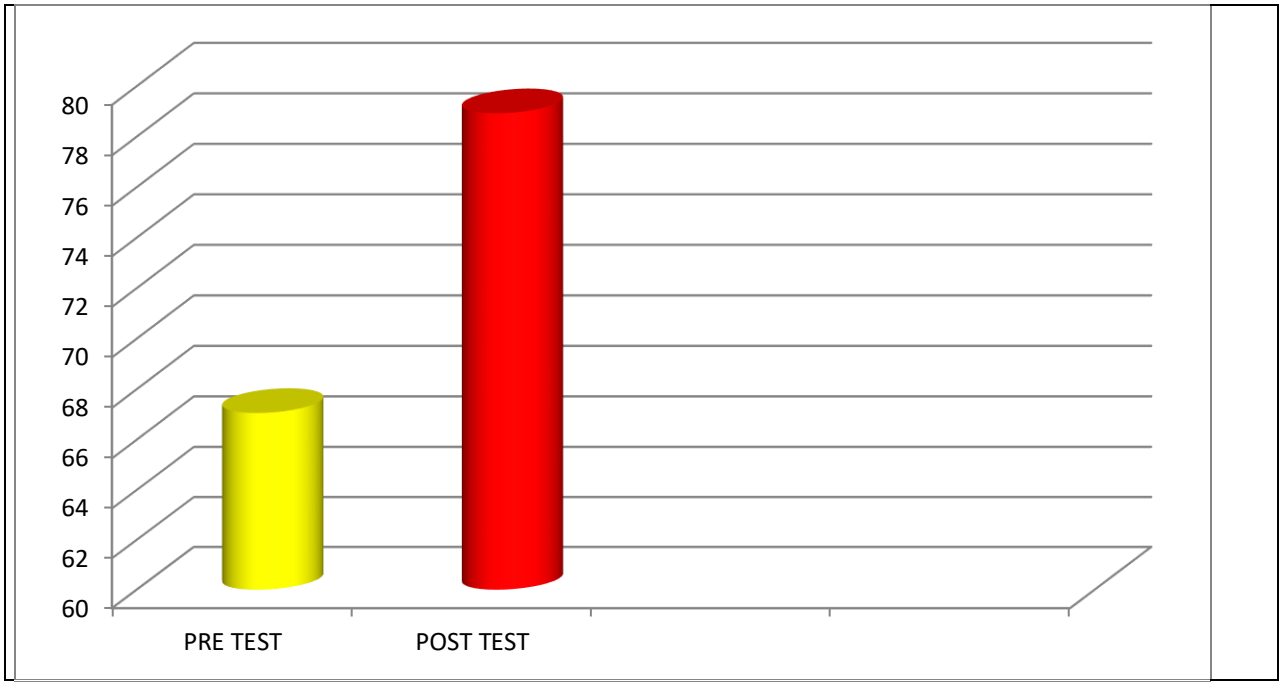
TABLE 1:

ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF PROM WITHIN GROUP A:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	67.6	15	5.13	1.32	11.33	10.00	0.043	**
Post-test	78.93	15	2.25	0.58				

***** Significant difference (P<0.05)

GRAPH 1



INTERPRETATION:

The above table shows the mean of pre-test and post – test values of group A were 67.6 and 78.93 respectively. The mean improvement of Group A was 11.33. The 't' value 10.0 and 'P' value less than 0.05 within Group A analysis.

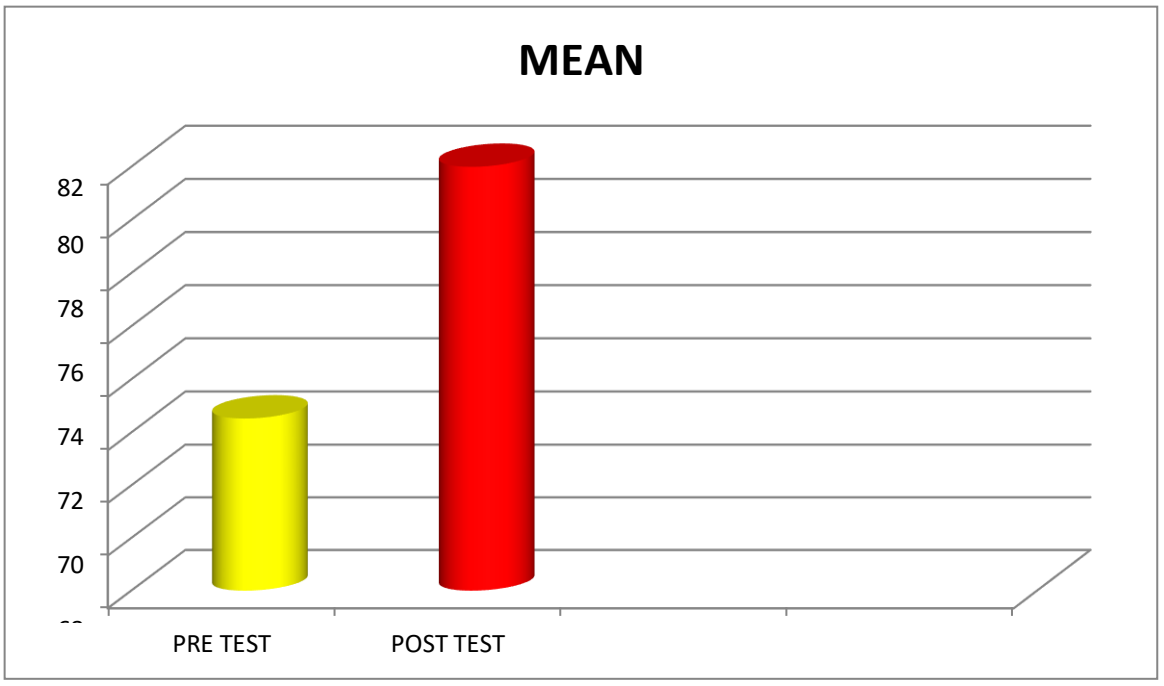
TABLE 2:

ANALYSIS OF PRE-TEST AND POST-TEST VALUES WITHIN GROUP B:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	72.53	15	4.25	1.09	9.47	7.97	0.036	**
Post-test	82.0	15	2.53	0.65				

***** Significant difference (P<0.05)

GRAPH 2



INTERPRETATION:

The above table shows the mean of pre-test and post – test values of group B were72.53 and 82.0 respectively. The mean improvement of Group B was 9.47. The 't' value 7.97 and 'P' value less than 0.05 within Group B analysis.

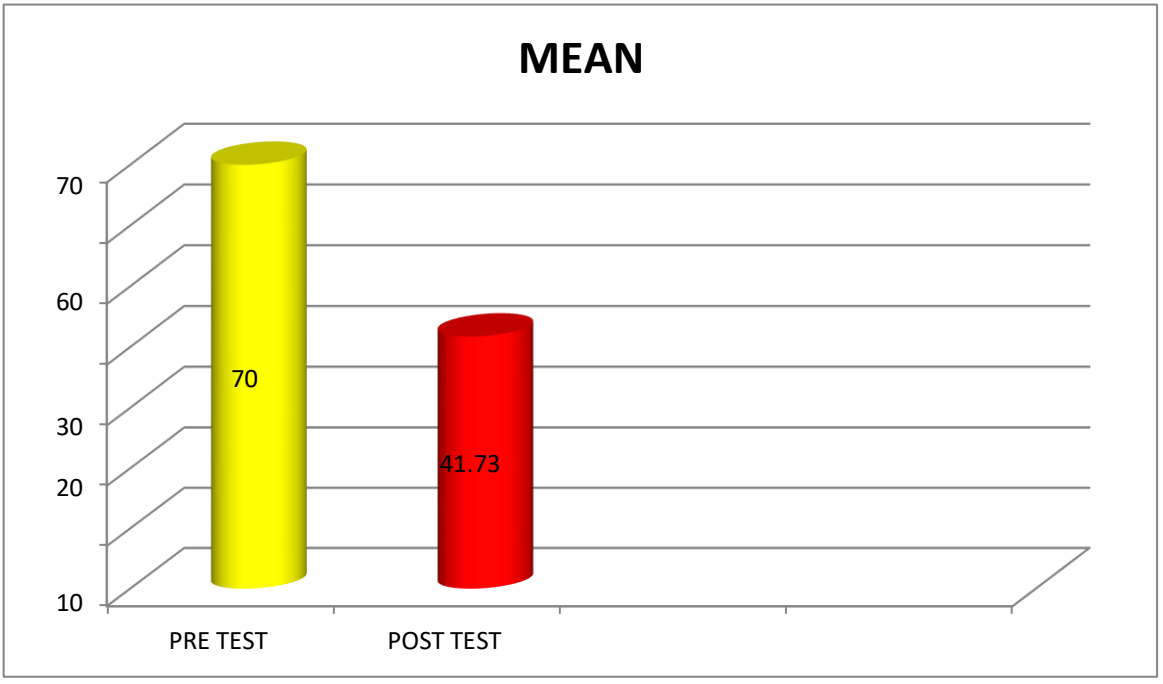
TABLE:3

ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF SPADI FOR SIGNIFICANCEWITHINGROUP A:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	70.0	15	4.69	1.21	28.27	15.72	0.037	***
Post-test	41.73	15	3.34	0.86				

***** Significant difference (P<0.05)

GRAPH 3



INTERPRETATION:

The above table shows the mean of pre-test and post – test values of group A were 70.0 and 41.73 respectively. The mean improvement in sit and reach test of Group A was 28.27. The 't' value 15.72 and 'P' value less than 0.05 for SPADI (Shoulder pain and Disability index) scores within Group A analysis.

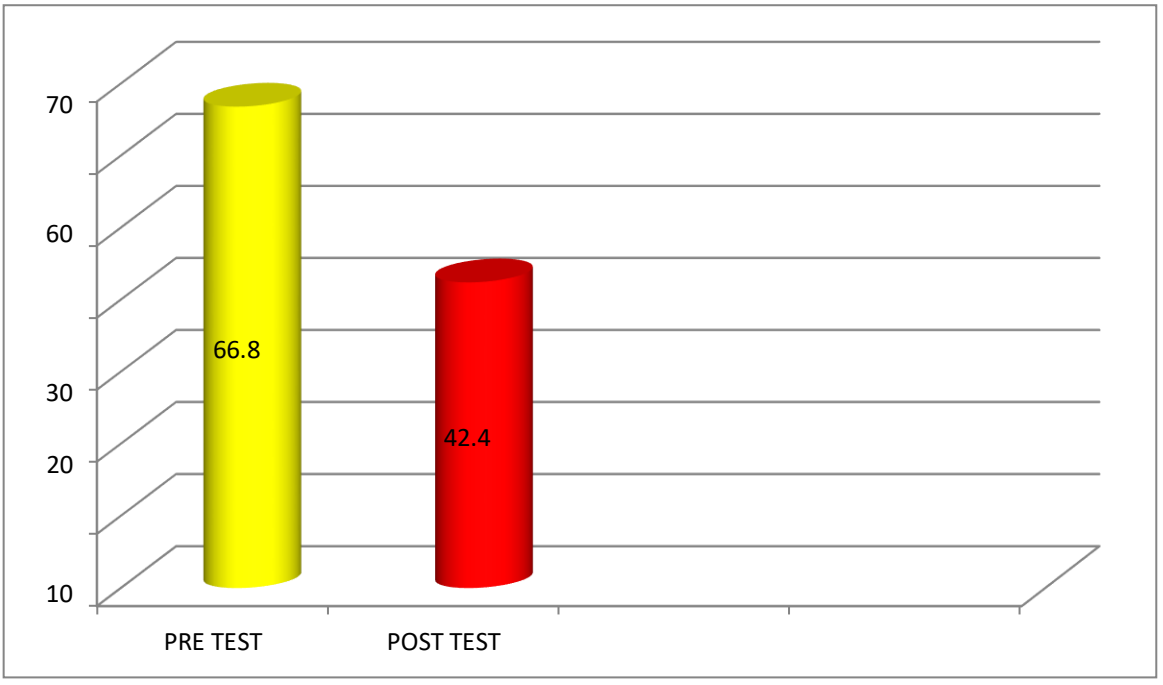
TABLE:4

ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF SPADI FOR SIGNIFICANCEWITHIN GROUP B:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	66.8	15	5.18	1.33	24.4	13.05	0.25	***
Post-test	42.4	15	3.29	0.84				

***** Significant difference (P<0.05)

GRAPH 4



INTERPRETATION:

The above table shows the mean of pre-test and post – test values of group B were 66.8 and 42.4 respectively. The mean improvement in sit and reach test of Group B was 24.4. The 't' value 13.05 and 'P' value less than 0.05 for SPADI ((Shoulder pain and Disability index) scores within Group B analysis.

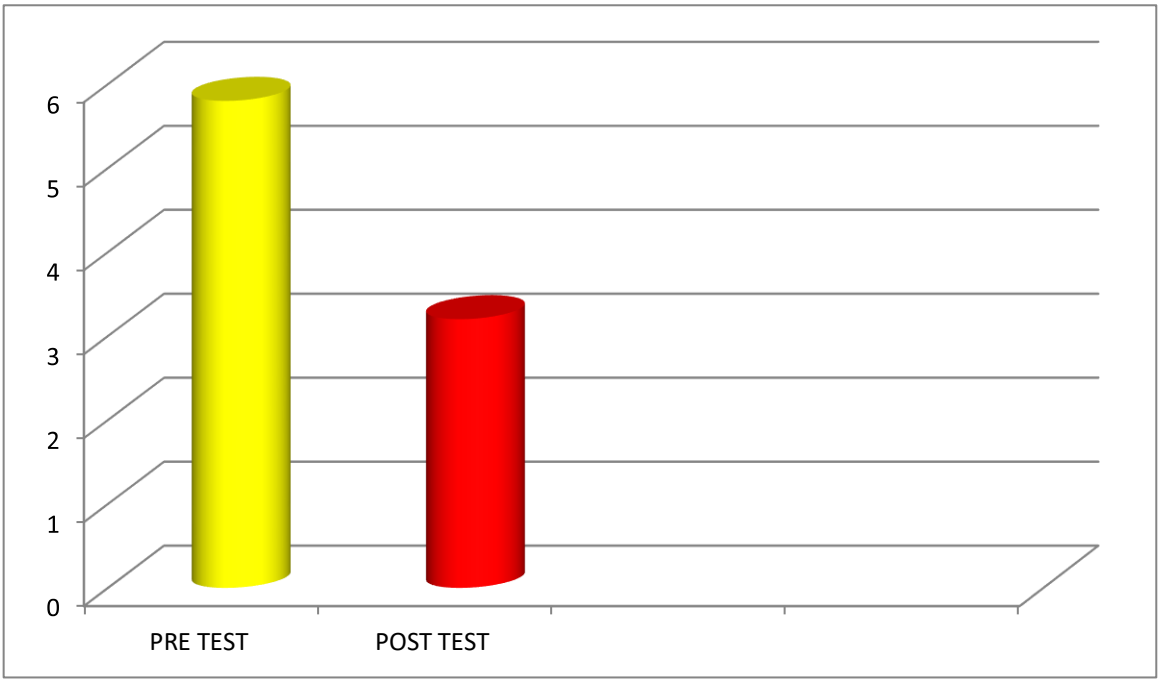
TABLE:5

ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF VAS FOR SIGNIFICANCE WITHIN GROUP A:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	5.8	15	0.77	0.02	2.6	11.06	0.35	**
Post-test	3.2	15	0.67	0.17				

***** Significant difference (P<0.05)

GRAPH 5



INTERPRETATION:

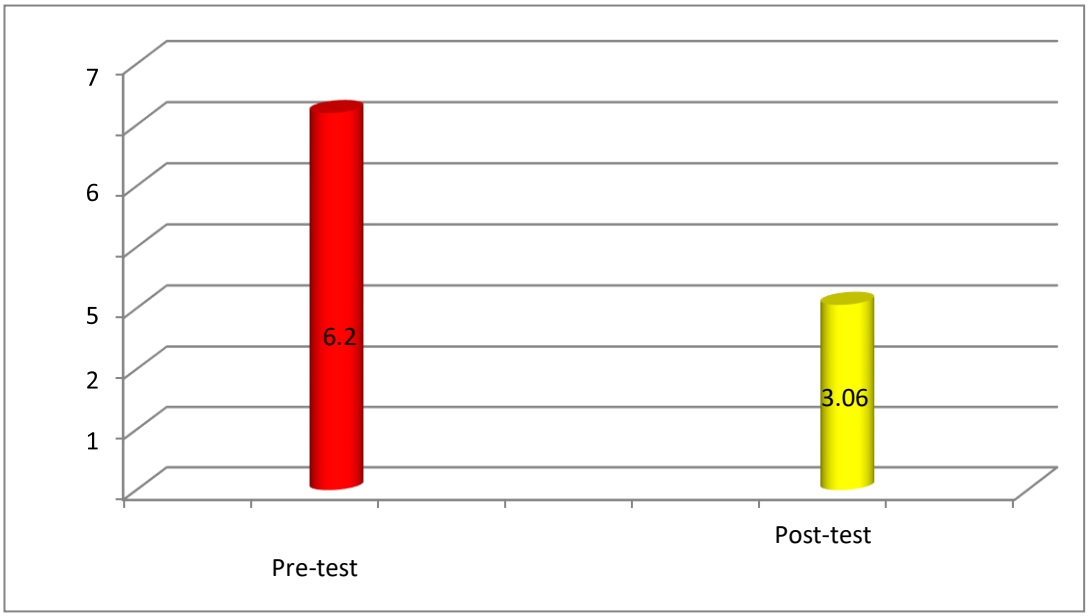
The above table shows the mean of pre-test and post – test values of group A were 5.8 and 3.2 respectively. The mean improvement in VAS of Group A was 2.6. The 't' value 11.06 and 'P' value less than 0.05 for VAS scores within Group A analysis.

TABLE:6

ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF VAS FOR SIGNIFICANCE WITHIN GROUP B:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
Pre-test	6.2	15	0.86	0.22	3.14	10.22	0.045	**
Post-test	3.06	15	0.70	0.18				

** Significant difference (P<0.05)



GRAPH 6

INTERPRETATION:

The above table shows the mean of pre-test and post – test values of group B were 6.2 and 3.06 respectively. The mean improvement in VAS of Group B was 3.14. The 't' value 10.22 and 'P' value less than 0.05 for VAS scores within Group B analysis.

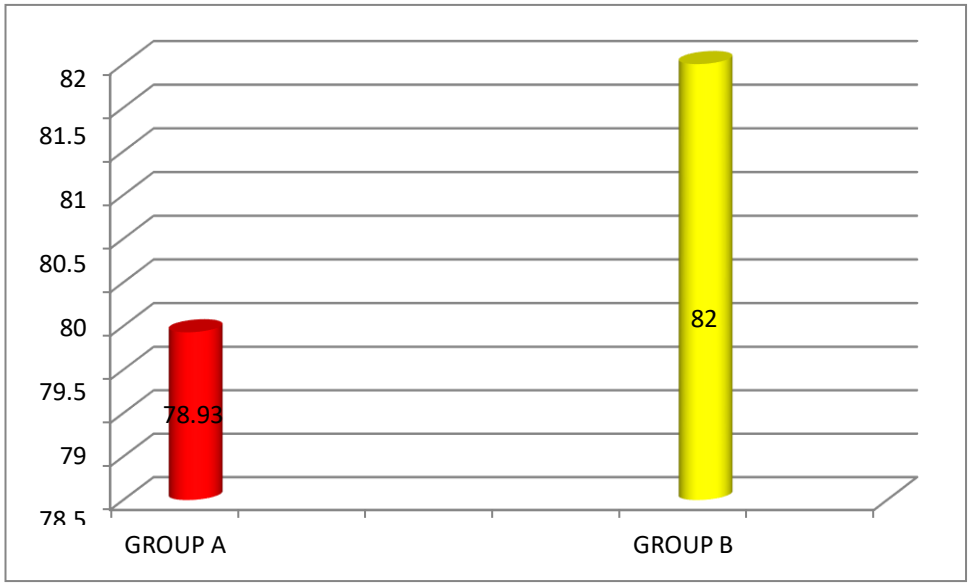
TABLE:7

BETWEEN GROUP A AND B (**PROM)**

PROM	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance
GROUP A	78.93	15	2.25	0.58	3.07	6.01	0.031	**
GROUP B	82.0	15	2.53	0.65				

** Significant difference (P<0.05)

GRAPH 7



INTERPRETATION:

The above table shows the mean of post – test values of Group A and Group B were 78.93 and 82.0 respectively. The mean improvement in PROM was 3.07.The 't' value 6.01 and 'P' value less than 0.05 for PROM scores betweenGroupA and B analysis. When compared to table value, the above 'P' value is lesser at P<0.05, which is highly significant for Group B.

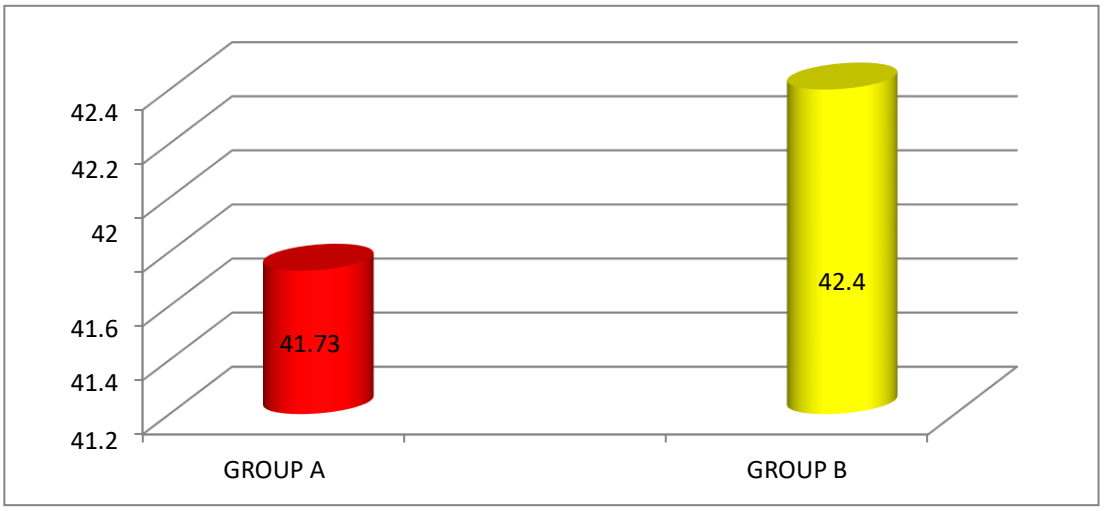
TABLE:8

BETWEEN GROUP GROUP A AND B SPADI

SPADI	**Mean**	**N**	**SD**	**Std. Error Mean**	**Mean Diff**	**T**	**P**	**Significance**
GROUP A	41.73	15	4.69	0.86	0.67	1.335	0.021	***
GROUP B	42.4	15	3.29	0.84				

**** Significant difference (P<0.05)

GRAPH 8



INTERPRETATION:

The above table shows the mean of post – test values of Group A and Group B were 41.73 and 42.4 respectively. The mean improvement in PROM was 0.67.The 't' value 1.335 and 'P' value less than 0.05 for PROM scores betweenGroupA and B analysis. When compared to table value, the above 'P' value is lesser at P<0.05, which is highly significant for Group B.

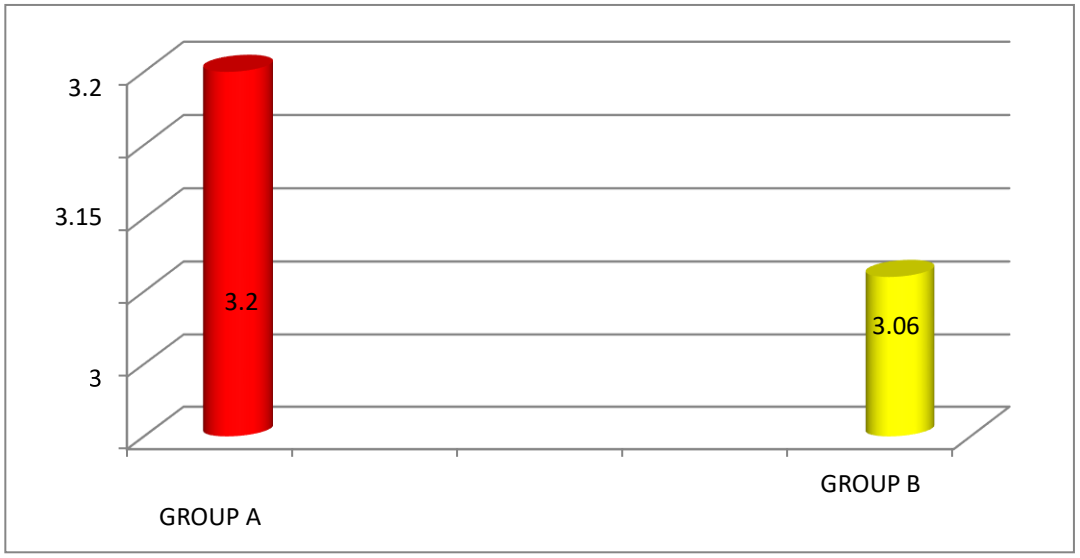
TABLE:9

BETWEEN GROUP A AND B VAS

VAS	**Mean**	**N**	**SD**	**Std. Error Mean**	**Mean Diff**	**T**	**P**	**Significance**
GROUP A	3.2	15	0.67	0.17	0.14	5.95	0.038	**
GROUP B	3.06	15	0.70	0.18				

****** Significant difference (P<0.05)

GRAPH 9



INTERPRETATION:

The above table shows the mean of post – test values of Group A and Group B were 3.2 and 3.06 respectively. The mean improvement in PROM was 0.14. The 't' value 5.95 and 'P' value less than 0.05 for VAS scores between Group A and B analysis. When compared to table value, the above 'P' value is lesser at P<0.05, which is highly significant for Group B.

DISCUSSIONS

Mulligan techniques are a kind of manual therapy for spinal or upper and lower extremity pain which use NAG (Natural Apophyseal Glide), SNAG (Sustained Natural Apophyseal Glide), or MWM (Mobilization with Movement) techniques. In this study I Have chosen MWM to evaluate the effect in T2Diabetic chronic frozen shoulder.

Mobilization with movement (MWM) is the concurrent application of sustained accessory mobilization applied by a therapist and an active physiological movement to end range applied by the patient. Passive end-of-range overpressure, or stretching, is then delivered without pain as a barrier.

Kachingwe et al (2008) found, there was significant increase in active ROM and decrease in pain, in patients with Shoulder dysfunction by using MWM techniques as described by Mulligan (1999). Passive movement produced by manual techniques resulted in pain reduction through activation of mechanoreceptors inhibiting nociceptive stimuli through the gate-control mechanism or through facilitation of synovial fluid nutrition (Threlkeld, 1992).

An additional explanation given that why MWM was better in decreasing pain and improving function is that, MWM technique has the additional benefit which may engage additional proprioceptive tissues, such as the golgi tendon organs activated by tendon stretch and restored the normal glenohumeral arthrokinematics and resulted in capsular stretching (Kachingwe et al, 2008).

Improved ROM by Mulligan‘s movement with mobilization is attributed to the mechanisms underlying it as described by Wright et al (1995), that the mechanism responsible for MWM treatment effects may feasibly involve changes in the joint, muscle, pain and motor control systems as it produce an immediate relief in pain and improve ROM respectively.

Vicenzino et al (2007) reports espousing clinically beneficial effects of Mulligan‘s mobilization-with-movement (MWM) treatment techniques by substantial pain reduction accompanied by improved function in shoulder disorders by reducing positional faults at joints (subluxations).

Instrument assisted soft tissue mobilization (KIASTM) is a skilled Myofascial intervention used for soft-tissue treatment. It is based on the principles of James Cyriax cross-friction massage.

Kinesio Instrument Assisted Soft Tissue Mobilization (KIASTM) is a simple, non-invasive form of manual therapy to manipulate or mobilize soft tissue structures of the human body. It tightens and loses its flexibility if stress is placed on the body or injury occurs. When fascial tightness or shortness occurs, stretching of fascia may result in faulty movement patterns in muscles and pain at distant sensitive areas of the body, e.g. blood vessels and nerves.

There was also more significant improvement of post score values of SPADI of group B compare to group A. The statistical value of post test score of VAS was also found to be decreased more in Group B than group A.

Mobilization is a manual therapeutic technique that fosters movement in stagnant tissues and joints. Spinal mobilization uses massage to break down scar tissue and restrictions that are typically associated with trauma to the soft tissue such as a strained muscle or pulled ligament.

In MWM technique, small vibrations, compression, and stretching are applied to the end points of the affected body region without causing pain. In addition, these techniques are practiced in a direction that causes no pain. The technique is now recognized in manual therapy worldwide.

KIASTM is a procedure in which Accel Tool is used to mechanically stimulate soft tissue structure store lieve musculoskeletal pain and discomfort and improve overall lmobility and function.

This therapy not only works on muscular tone, whether facilitation or inhibition, but also reduces the risk of injury during exercises. This not only reduces Delayed Onset Muscle Soreness (DOMS) but also increases collagen synthesis and regeneration in oxygen deprived soft tissue structures due to exercises, improves flexibility, muscle contraction and structural proportion.

So to reduce atrophy of the shoulder muscles, diffuse tenderness along the shoulder joint, restriction of movements of the shoulder, painful in early and middle stages of disease, for improvement of external rotation, this study found KIASTM having more significant effects than mulligan’s Movement with mobilization techniques.

CONCLUSIONS

This study concludes that both movement with mobilization (MWM) and KIASTM with dynamic exercises program having significant effects in diabetic chronic frozen shoulder but comparatively KIASTM with dynamic exercises programm is more effective than Movement with mobilization (MWM) techniques while statistically comparing.

LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FURTHERSTUDY

1. The study was limited due to shorter duration of treatment.
2. The study was limited due to less number of Diabetic patients with shoulder involvement.
3. The study was limited age group between 40-70 years.
4. The study was limited to upper limb function involvement in frozen shoulder patients.

RECOMMENDATIONS FOR FURTHER STUDY

1. It may be recommended that treatment course could be more than 12 weeks, so that more results could be evaluated.
2. It may be recommended that study could be done on more than 30 frozen shoulder patients with upper limb function involvement.
3. It may be recommended that study could be done on different age groups.
4. It may be recommended that more studies are needed to be done in various techniques to improve upper limb functions in frozen shoulder patients.

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