International Journal of Medical Science and Clinical Research
www.journalofmedical.com
Online-ISSN: 2664-7761, Print ISSN: 2664-7753
Received: 26-01-2023, Accepted: 11-02-2023, Published: 28-02-2023
Volume 5, Issue 1, 2023, Page No. 29-33

Effectiveness of unilateral self stretching of pectoralis muscles in frozen shoulder stage 2

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Abstract

Background: In frozen shoulder, the pectoralis muscles Undergoes tightness, which affects the shoulder joint mainly in the abduction and external rotation of shoulder. There are many physiotherapy interventions used in treatment of frozen shoulder and among them, Unilateral Self stretching of pectoralis muscles is done resolve the associated dysfunctions like pain and tightness.

Objective: To compare the effectiveness of unilateral self- stretching of the pectoralis muscles in along combination with ultrasound in frozen shoulder stage 2.

Methodology: 20 Patients with frozen stage 2 were selected and divided into two groups based on the selection criteria. Group A received unilateral self- stretching of the pectoralis muscles with the ultrasound and Group B received pendular exercise, fingers ladder and towels stretching exercise. shoulder pain and disability index used to measure the pain and disability and Active Shoulder range of motion using Goniometry were used as outcome measures pre and post treatment.

Result: comparing pre to post intervention values in group A showed average improvement in shoulder abduction and B group showed significant improvement in shoulder abduction but Group A and Group B, there was significant improvement noted in external rotation and SPADI score

Conclusion: The present study concluded that both the groups showed improvement statistically and clinically in terms of pain and ROM, but there is average improvement in the shoulder abduction who received unilateral self- stretching of the pectoralis muscles with ultrasound.

Keywords: frozen shoulder, unilateral self- stretching

Introduction

Adhesive capsulitis (AC), is also known as frozen shoulder it is an insidious painful condition of the shoulder joint. This inflammatory condition this causes fibrosis of the glenohumeral joint capsule it is accompanied by gradually progressive stiffness and significant restriction of range of motion (typically external rotation) [1]. Frozen Shoulder can be primary or secondary. Primary Frozen shoulder is idiopathic, whereas secondary Frozen shoulder has a known cause, such as immobilization, rotator cuff disease, biceps tendinitis, trauma, Myocardial infarction, or psychological disturbance [2]. People with loss of shoulder ROM have difficulty in completing their activities of daily living [3].

Stages of frozen shoulder, painful phase first phase (1 to 2 months), Frozen Stage (4 months to 9 months): The second phase of the frozen shoulder is known as adhesive stage. The patient during this stage shall experience the shoulder being stiff. During this stag a definitive diagnosis can be made, differentiating frozen shoulder from rotator cuff syndrome. In rotator cuff syndrome, a patient has trouble moving his/her arm, but a therapist can manipulate the arm and move it. Whereas in a frozen Shoulder, neither the patient nor the therapist can move the shoulder joint. Pain during this phase is not as excruciating as in the earlier phase, but pain may cause from performing simple activities. Since the rotation of the shoulder joint is limited, performing day-to-day activities such as washing hair, donning and doffing of clothes, reaching for a seatbelt difficult [4, 5] Thawing (12 to 42 months) The third phase is characterized by only decreased ROM [2].

The treatment of the frozen shoulder may be either conservative or surgical. Conservative treatment includes various exercise methods and physiotherapy modalities such as thermotherapy and cryotherapy [6]. Exercise Programs consist of active and passive ROM exercise, stretching exercises, manipulation and mobilization techniques, strengthening exercises, patient education And home exercises guided by physiotherapist [7].

In upper limb's pectoral girdle, the pectoralis major is sizable, flat muscle. The clavicular, the sternocostal and the abdominal Head are three parts or heads that it Give fan shaped look. The clavicular section with clavicular portion of deltoid engages in adduction and elevation of the arm internal rotation and primarily abduction is provided by the sternoclavicular part. The arm depression influenced by the abdomen [8]

The pectoralis minor, which forms the front wall of the axilla and is triangular in shape, lies beneath the pectoralis major. It comes from the third to fifth rib margins, close to the costochondral junction. As a result, the fibers move laterally and upward to enter the medial border and superior surface of the scapula's coracoid process. The stability, depression, abduction or protraction, internal rotation, and downward rotation of the scapula are all actions of this muscle [9]

Exercises for self-stretching include unilateral self-stretches (corner stretch) ROM can be increased by static stretching [10].

Methodology

1. Study Design
Experimental

2. Study setting
Dr. B. R. Ambedkar College of Physiotherapy, Dr. B. R. Ambedkar Medical College and Hospital, Bangalore 560045.

3. Criteria for sample selection
The patients were selected for the study based on the following criteria

Inclusion criteria
- Patient diagnosed with frozen shoulder
- Pain in the shoulder joint
- Aged between 40-80 years
- Duration of symptoms between 4 to 9 months

Exclusion criteria
- History of surgery
- Implant
- Any shoulder injuries or trauma

4. Sample size
20 participants

5. Sampling method
Simple Random Sampling
The patients were randomly assigned into 2 groups, Group A patient received unilateral self- stretching of pectoralis muscles along with ultrasound and Group B in patient received pendular exercise, finger walk, towels stretch exercises

6. Study duration
6 months

7. Treatment duration
10 to 15minutes

8. Procedure and treatment
Both, the Group A and Group B were assessed with the outcome measures, followed by administration of the treatment and were immediately reassessed with the same outcome measures. Self- stretch done in the standing position and required the patient to abduct the shoulder to 90° with the elbow flexed to 90° and place the palm on a flat planar surface. The patient then rotated the trunk away from the elevated arm, increasing the horizontal abduction at the shoulder and maximizing the stretch across the chest.30 second hold, 2sets, 3 repetition.

Fig 1: unilateral self stretching of pectoralis muscles

Data analysis and interpretation
Statistical analysis of the data was done using SPSS 20.0. Descriptive statistics were calculated and summarized. which includes frequency, percentage mean and standard deviation. Inferential statistics had been carried out in the study. Skewed data were reported as median and inter quartile range. Pre post comparison was done using Wilcoxon signed rank test and between groups comparison was done using Mann Whitney U test. Level of significance was set at 5%.

The study of gender on the basis of group shows that in both group A and group B there was 7(70%) female and 3(30%) males.

Table 1: Table showing pre post comparison of Shoulder abduction in group A and group B

Shoulder abduction		Median	IQR	Average improvement	Z value	p value
Group A	Pre	67.5	(60-90)	22.5	3.908	P<0.05
	Post	90.0	(89.5-105)			
Group B	Pre	80.0	(70-95.0)	17.5	2.877	P<0.05
	Post	97.5	(90-115)			

The comparison between pre and post shoulder abduction is shown in the above table. In group A the average pre shoulder abduction was 67.5 with inter quartile range (60-90) and post shoulder abduction was 90.0 with inter quartile range (89.5-105), with an average improvement of 22.5 and p<0.05 which is statistically significant. In group B the average pre shoulder abduction was 80.0 with inter quartile range (70-95.0) and post shoulder abduction was 97.5 with inter quartile range (90-115), with an average improvement of 17.5 and p<0.05. The analysis shows statistically significant improvement of shoulder abduction in group B.

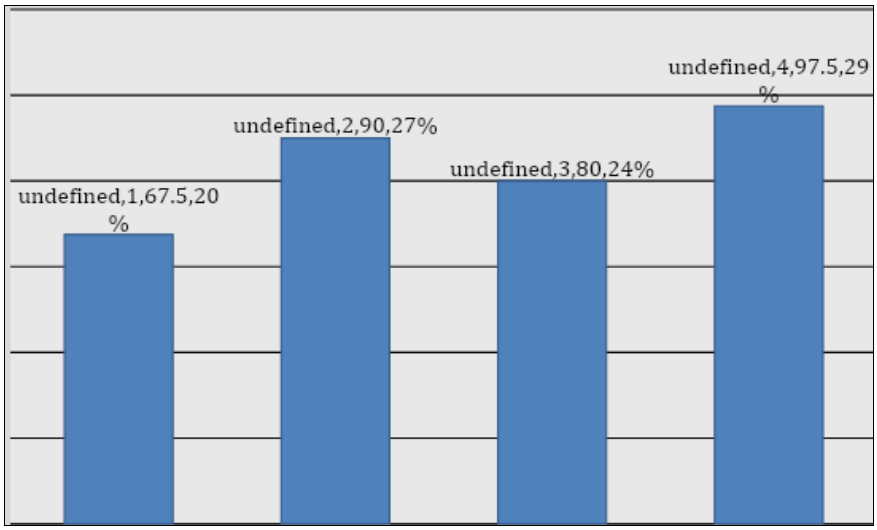

Fig 1: Representation of Shoulder abduction in group A and group B

Table 2: Table showing pre post comparison of Shoulder external rotation in group A and group B

Shoulder external rotation		Median	IQR	Average improvement	Z value	P value
Group A	Pre	47.5	(40-60)	15	2.840	p<0.05
	Post	62.5	(53.7571.25)			
Group B	Pre	55.0	(48.75-75)	15	2.841	p<0.05
	Post	70	(60-75)			

The comparison between pre and post Shoulder external rotation is shown in the above table. In group A the average pre shoulder external rotation was 47.5 with inter quartile range (40-60) and post shoulder external rotation was 62.5 with inter quartile range (53.75-71.25) with an average improvement of 15 and p<0.05. In group B the average pre shoulder external rotation was 55 with inter quartile range (48.75-75) and post shoulder external rotation was 70 with inter quartile range (60-75), with an average improvement of 15 and p<0.05. The analysis shows statistically significant improvement of shoulder external rotation in group A and group B.

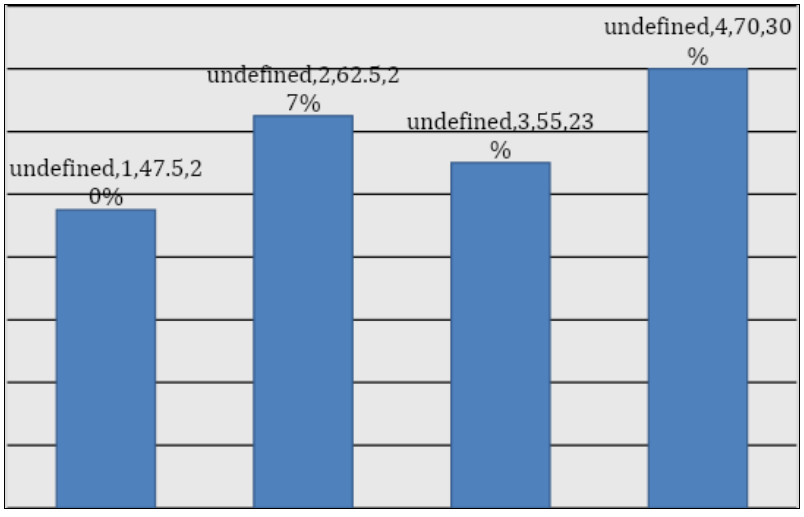

Fig 2: Representation of shoulder external rotation in group A and group B

Table 3: Table showing pre post comparison of SPADI score in group A and group B

Spade score		Median	IQR	Average improvement	Z value	p value
Group A	Pre	69.95	(49.4-80.27)	31.75	2.803	p<0.05
	Post	38.2	(24.02-53.45)			
Group B	Pre	62.2	(47.22-75.62)	23.4	2.837	p<0.05
	Post	38.8	(27.22-50.2)			

The comparison between pre and post SPADI score is shown in the above table. In group A the average pre SPADI score was 69.95 with inter quartile range (49.4-80.27) and post SPADI score was 38.2 with inter quartile range (24.02-53.45), with an average improvement of 31.75 and p<0.05. In group B the average pre SPADI score was 62.2 with inter quartile range (47.22-75.62) and post SPADI score was 38.8 with inter quartile range (27.22-50.2), with an average improvement of 23.4 and p<0.05. The analysis shows statistically significant improvement of SPADI score in group A and group B.

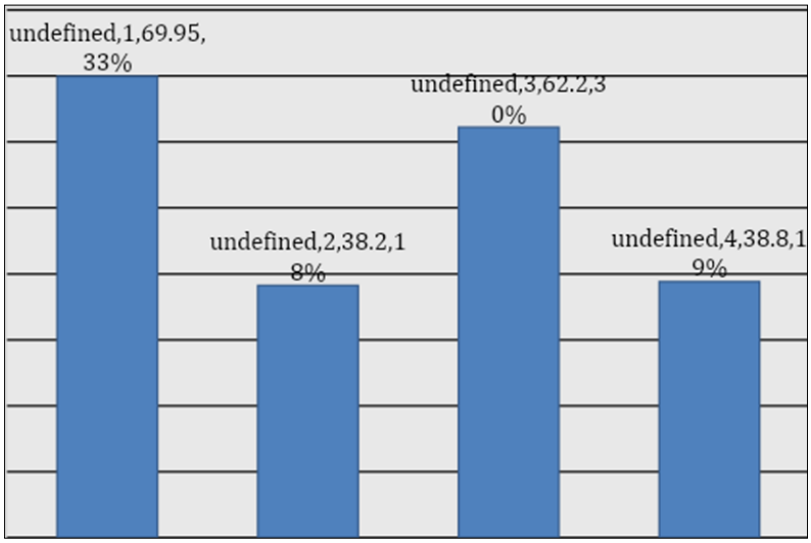

Fig 3: Showing pre post comparison of SPADI score in group A and group B

Table 4: Table showing between group comparison in shoulder abduction, shoulder external rotation and SPADI score

Group	Average improvement	t value	p value
Group A	22.5	12.0	p<0.05
Group B	17.5		
Group A	15	50.0	p>0.05
Group B	15		
Group A	31.75	25.0	p>0.05
Group B	23.4		

The between group comparison of shoulder abduction showed that in group A average improvement in shoulder abduction was 22.5 and group B was 17.5 with of p<0.05. Between group comparison of shoulder external rotation showed in group A average improvement in shoulder external rotation was 15 and group B was 15 with p>0.05. In SPADI score the average improvement in group A was 31.75 and group B 23.4 with p>0.05. The analysis shows average improvement in shoulder abduction is significantly more in group A than group B. Shoulder external rotation and SPADI score does not vary significantly between group A and group B.

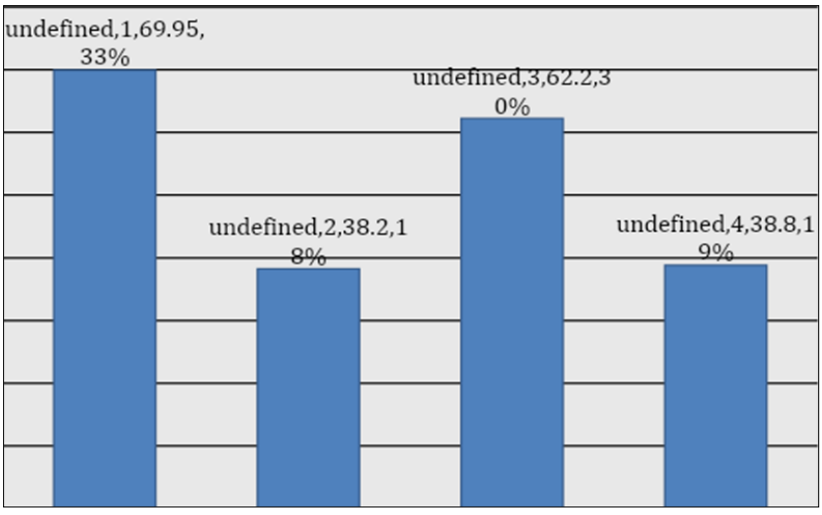

Fig 4: Showing between group comparison in shoulder abduction, shoulder external rotation, ROM and SPADI

Discussion

On Comparing group, A and group B t value of shoulder abduction 12.0 t value of shoulder external rotation 50.0 t value of SPADI score 25.0

The analysis shows average improvement in shoulder abduction is significantly more in group A than group B shoulder external rotation and SPADI score does not vary significantly between group A and group B

The possible physiology of reduction in pain and improved range of motion due to the following reasons. Unilateral self- stretch of Pectoralis muscles stretching of the muscle fibers begins with the sarcomere the basic unit of contraction in the muscle fiber as the sarcomere contracts the area of overlap between the thick and thin myofilaments increase. as it stretches, this area of overlap decrease, allowing the muscle fiber to elongate. The lengthening reaction is possible only because the signaling of Golgi tendon organ to the spinal cord is powerful enough to overcome the signaling of the muscle spindles telling the muscle to contract. Stretching induced pain reduction mechanism include increased sensory (pain) tolerance [11]. gate control theory. Diffuse noxious inhibitory control. Myofascial meridians and reflex induced increases I parasympathetic nervous activity. Unilateral self -stretching effectively lengthens pectoralis muscles relative to its resting length. Stretching helps in reducing the pain and increasing the flexibility of the muscle improve the range of motion [12].

Conclusion

The conclusion of this study is based on the comparison of pre post mean measures of Active Shoulder Abduction ROM, Active Shoulder External Rotation ROM, and shoulder pain and disability index Scale within and between Group A and Group B, which concluded that there was improvement seen in both the groups, average improvement in shoulder abduction is significantly more in group A and there was no significant difference seen in both groups in SPADI and shoulder external rotation.

As per Data analysis and interpretation and clinical improvement, Alternate hypothesis is rejected, and Null hypothesis is accepted which states “There was no significant difference in terms of pain and range of motion among the patients who received unilateral self- stretching pectoralis muscle along with ultrasound comparison with the finger walk, towels stretch and pendular exercise.

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