Influence of High Grade Mobilizing Exercise on Shoulder Function in Frozen Shoulder

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ABSTRACT

Background: *Adhesive capsulitis or frozen shoulder is an uncommon entity in athletes. However, it is a common cause of shoulder pain and disability in the general population. Although it is a self limiting ailment; its long, restrictive and painful course forces the affected person to seek treatment.* ***Objective:*** *The purpose of this study was to investigate the effect of high grade mobilizing exercise on shoulder function in management of frozen shoulder.* ***Methods:*** *Thirty male and female frozen shoulder patients with age ranged from forty to sixty years participated in this study. They were assigned randomly into two experimental groups. Group (A) consisted of fifteen patients (8 males and 7 females) with mean age of 50.33 (±4.28) years who received a high grade mobilizing exercise. Each patient was treated for three sessions per week for a total period of six weeks. Group (B) consisted of fifteen patients (9 males and 6 females) with mean age of 49.86 (± 4.35) years who received low grade mobilizing exercise. Each patient was treated for three sessions per week for a total period of six weeks. All patients were assessed before and after the study for their global assessment domain, daily activities domain, recreational and athletic domain, and work domain by using Shoulder Rating Questionnaire (SRQ).* ***Results:*** *The results revealed that there were significant differences between both groups in favor of group (A) regarding global assessment domain, daily activities domain, recreational and athletic domain, and work domain.* ***Conclusion:*** *High grade mobilizing exercise significantly improved the function of the shoulder joint than low grade mobilizing exercises.*

Key words: *High Grade Mobilizing Exercise, Shoulder Function, Frozen Shoulder.*

INTRODUCTION

Adhesive capsulitis or frozen shoulder is a common cause of shoulder pain and disability in the general population However, it is an uncommon entity in athletes. Although it is a self limiting ailment, its long, restrictive and painful course forces the patient to seek treatment[9].

Frozen shoulder can be due to post-traumatic or idiopathic causes but the term adhesive capsulitis should be reserved for the idiopathic type of shoulder stiffness. Factors associated with adhesive capsulitis include female gender, trauma, immobilization, diabetes, thyroid disease, age older than 40 years, stroke, myocardial infarction, the presence of autoimmune diseases, cervical spine disorders and reflex sympathetic dystrophy syndrome[4,11].

Idiopathic adhesive capsulitis is characterized by fibrosis of the capsule resulting with progressive, painful loss of active and passive shoulder motion[7]. Conservative management remains the mainstay treatment of adhesive capsulitis. This includes mobilization, chiropractic manipulation of the shoulder, soft tissue therapy, exercise, therapeutic modalities, non steroidal anti-inflammatory drugs, and steroid injections[9]. Joint mobilization is a technique frequently used by physiotherapist to address the problems of pain and joint stiffness, in order to reduce pain, improve joint movement an earlier return to activities[10].

Few controlled investigations have examined the efficacy of joint mobilization, and those that have been performed have produced conflicting results. Investigators studying the effect of mobilization on dog carpi and human metacarpophalangeal joints have demonstrated increased motion over control subjects[14,15], while others who studied the effect on human shoulders have not found changes in mobility[1,13]. Based on the conflicting results of the studies, the therapeutic effect of joint mobilization remains unclear. In spite of the presumed presence of capsular dysfunction in primary adhesive capsulitis, there have been no controlled

studies evaluating the effect of joint mobilization on subjects with this diagnosis[2].

Physical therapists frequently treat frozen shoulder and routinely administer joint mobilization with the intent of restoring capsular mobility without evidence that joint mobilization is a necessary addition to a treatment regimen of hot packs, active range of motion, physiologic stretching, muscle strengthening exercises, soft tissue mobilization, and patient education[2]. There is no general acceptance of one standard conservative treatment of the frozen shoulder, which make difficult to any therapist to establish a regime suitable for application[5].

Although mobilization techniques are frequently used by physical therapists and manual therapists, few studies have described the use of these techniques in joints with capsular adhesions[17]. At the same time the effectiveness of mobilization techniques of various intensities in improving shoulder range of motion and function is still unknown. The decision as to whether or not to start treatment of adhesive capsulitis at all may be dependent on the course and duration of the symptoms[18]. Further investigation is warranted to compare the therapeutic effect of these mobilizations with the natural course of the disease or other treatment regimens[17], which may affect intervention rehabilitation of the shoulder dysfunction.

The intensity and duration of the mobilization techniques may have varied or may have been insufficiently described among published studies; only five published studies described the effectiveness of mobilization techniques in subject with shoulder adhesive capsulitis from 1984 to 2004. There is no information provided about the intensity of the mobilization techniques during frozen shoulder stages[3].

The application of high grades mobilizations techniques to regain normal extensibility of shoulder capsule has been recommended by vermeulen et. al. (2000)[17]. But van den hout et al (2005) found no statistically significant differences between the high grades mobilizations techniques comparing by low grades mobilizations techniques in treatment of frozen shoulder syndrome. Future research must be done to investigate whether the application of high grades mobilizations techniques in early stages of adhesive capsulitis is effective or not[18].

Few studies have been done searching for good treatment for adhesive capsulitis. Some of these studies concluded that mobilization, manipulation of the shoulder, soft tissue therapy, exercises, therapeutic modalities, non steroidal anti-inflammatory drugs, and steroid injections are suitable for treating this pathology. Others fail to conclude anything. And also some researchers found high-grades mobilization techniques was effective, on the other hand others researchers found that low-grades mobilization techniques was effective, Therefore the purpose of this study was to investigate the effect high grade mobilizing exercise on shoulder function in management of frozen shoulder when compared with low grade mobilizing technique.

MATERIALS AND METHODS

Subjects

Thirty male and female patients with adhesive capsulitis with duration of illness of two to ten weeks participated in this study their age ranged from 40-60 years. These patients were assigned randomly into two experimental groups. The first experimental group (A) received high grades mobilization techniques while the second experimental group (B) received low grades mobilization techniques.

Inclusion criteria

- Unilateral adhesive capsulitis, defined as more than 50% loss of passive movement of the shoulder joint compared to the non-affected side, in one or more of three movement directions.
- Duration of illness vary between two to ten weeks from onset of illness

Group (A): consisted of fifteen patients (8 males and 7 females) with mean age of 50.33(± 4.28) years who received a high grade mobilizing exercise. Each patient was treated for three sessions per week for a total period of six weeks.

Group (B): consisted of fifteen patients (9 males and 6 females) with mean age of 49.86

(±4.35) years who received low grade mobilizing exercise. Each patient was treated for three sessions per week for a total period of six weeks.

Exclusion criteria included previous shoulder or upper extremity surgery, pathological conditions of the upper extremity e.g. tumors, infections and other systemic diseases, eg. diabetes, rheumatoid arthritis.

Evaluation procedure:

All patients were assessed before and after the study for their global assessment domain, daily activities domain, recreational and athletic domain, and work domain by using Shoulder Rating Questionnaire (SRQ). Patients received verbal and written descriptions of all procedures, and the testing was performed after they signed written informed consent form. Van den Hout et al. (2005)[16] found that the shoulder rating questionnaire is valid and reliable in measuring shoulder functional disability.

Treatment procedures

Each patient treated for 18 sessions over 6 weeks, 3 sessions per week be given each other day[1].

Group (A): Intervention using high grade mobilization technique (HGMT) given triple a week for 20 minutes. The techniques described by Maitland was used, as follows. At the start of each intervention session, the physical therapist examined the patient's range of motion in all direction to obtain information about the end-range position and the end-feel of glenohumeral joint. Intervention started with a few minutes of warming up consisting of rhythmic mid-range mobilization with the patient in a supine position. There after the therapist's hands placed closed to glenohumeral joint, and the humerus bringed into a position of maximal flexion of sagittal plane. After 10 to 15 repetitions of intensive mobilization techniques in this end-range position the direction of mobilization were altered by varying the plane of elevation or by varying the degree of rotation. In addition as an alternative to varying the direction of mobilization, other movement such as gliding techniques and distraction in that joint position were used. In each direction of mobilization, 10 to 15 repetitions performed, and the mobilization grade (3 or 4) and the duration of prolonged stress were varied according to the patient's tolerance[17].

Group (B): Intervention using low grade mobilization techniques (LGMT) given triple a week for 20 minutes. The techniques described by Maitland was used, as follows. At the start of each intervention session, the physical therapist examined the patient's range of motion in all direction to obtain information about the end-range position and the end-feel of glenohumeral joint. In contrast to the protocol used for the high grade mobilizing techniques group, the therapist explicitly informed the subjects that all techniques should be performed without causing pain in the shoulder. Mobilization techniques commenced in the basic starting positions with translation and distraction techniques were performed with the joint near its neutral position (grade I). Reflex muscle activity was carefully monitored because it can be a first indication of joint pain. If joint mobility increase, then mobilization techniques were adjusted, and the amplitude of movements were increased without reaching the limits of range of motion (grade II). After 10 to 15 repetitions, mobilization altered by varying the plane of elevation or by varying the degree of rotation. In addition as an alternative to varying the direction of mobilization, other movement such as gliding techniques and distraction in that joint position will used . In each direction of mobilization, 10 to 15 repetitions performed[18].

RESULTS

Unpaired t-test revealed no significant difference between group (A) with mean age of 50.33 (±4.28) and group (B) with mean age of 49.86 (±4.35) with T- test = 0.29 and P-value = 0.77 (Table 1) and no significant difference between both groups in their weights, and heights where their T and P-values were (0.49, 0.62), and (0.39, 0.69) respectively.

Table (1): Demographic data of both groups.

Items	Group A	Group B	t-value	P-value	S
	Mean ± SD	Mean ± SD			
Age (yrs)	50.33 (±4.28)	49.86 (±4.35)	0.29	0.77	NS
Weight (Kg)	83.66 (±10.04)	81.93 (±9.01)	0.49	0.62	NS
Height (cm)	168.8 (±8.68)	167.4 (±10.84)	0.39	0.69	NS

SD: standard deviation P: probability S: significance NS: non-significant.

Within group (A) differences

Paired t-test showed significant difference ($P < 0.05$) between the means before and after treatment in group (A) as regards to global assessment, daily activities, recreational and athletic and work domains (Table 2).

Table (2): Within group (A) differences.

	Before	After	T-value	P-value
Global assessment domain	4.033(± 1.98)	11.70(± 2.30)	17.603	0.0001
Daily activities domain	5.40(± 2.09)	15.13(± 2.77)	17.780	0.0001
Recreational and athletic domain	5.26(± 1.59)	11.30(± 1.88)	9.701	0.0001
Work domain	2.70(± 0.92)	7.66(± 1.13)	18.145	0.0001

Data are expressed as means (± SD).

Within group (B) differences

Paired t-test revealed that there was a significant difference ($P< 0.05$) between the means before and after treatment in group (B) as regards to global assessment, daily activities, recreational and athletic, and work domains (Table 3).

Table (3): Within group (B) differences.

	Before	After	T-value	P-value
Global assessment domain	5.16(± 1.54)	11.60(± 1.83)	16.498	0.0001
Daily activities domain	7.16(± 1.80)	15.20(± 2.21)	23.648	0.0001
Recreational and athletic domain	7.63(± 2.52)	11.20(± 1.60)	4.975	0.0002
Work domain	3.76(± 0.77)	7.70(± 0.92)	13.651	0.0001

Data are expressed as means (± SD).

Comparison between groups

Unpaired t-test was used to show difference between groups as regards to global assessment, daily activities, recreational and athletic, and work domains. The results of the present study revealed that there were significant differences between the mean difference values of both groups in favor of group (A) ($P < 0.05$) regarding global assessment, daily activities, recreational and athletic and work domain where the mean difference values in group (A) was higher than group (B) (Fig. 1) (Table 4).

Table (4): Comparison between groups.

	GROUP A	GROUP B	t-value	P value
Global assessment domain	7.66(± 1.68)	6.43(± 1.51)	2.110	0.0439
Daily activities domain	9.73(± 2.12)	8.03(± 1.31)	2.639	0.0134
Recreational and athletic domain	6.03(± 2.40)	3.56(± 2.77)	2.599	0.0148
Work domain	4.96(± 1.06)	3.93(± 1.11)	2.600	0.0147

Data are expressed as means (±SD).

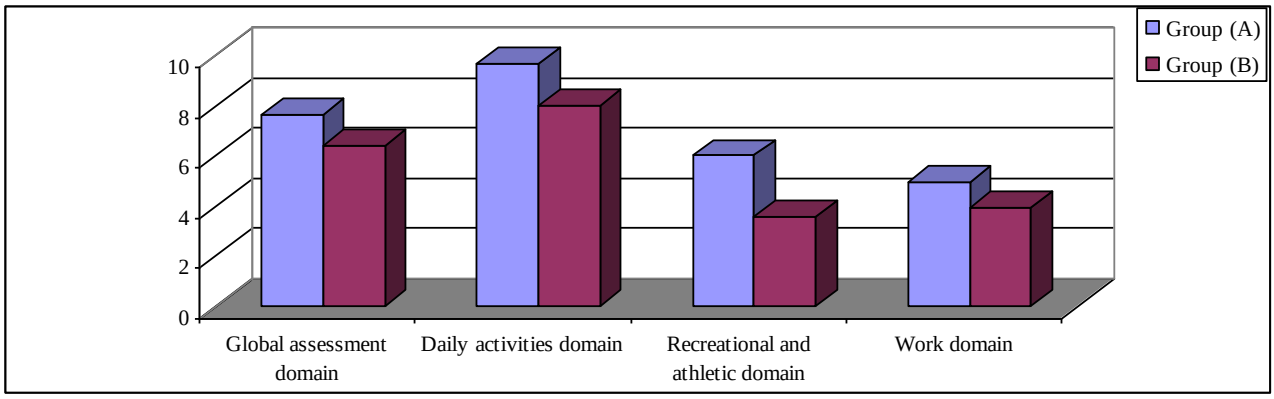

Fig. (1): Mean values of global assessment, daily activities, recreational and athletic and work domains of both groups.

DISCUSSION

This study designed to investigate the effect of high grade mobilizing exercise on shoulder function in management of frozen shoulder. The results of this study showed that both treatment strategies showed clinically significant improvement in all measured variables. This could be explained as joint mobilization is used frequently in order to reduce pain, improve joint movement an earlier return to activities[10] and may be due to application of high grades mobilizations techniques to regain normal extensibility of shoulder capsule has been recommended by vermeulen et al. (2000)[17].

This results agreed with Nicholson et al. (1985)[13] who investigated twenty patients with painful restriction of the glenohumeral joint to compare the effects of joint mobilization plus active exercise to the effects of active exercise alone, their results showed that flexion and abduction improved more in the mobilization group and pain scores did not differ significantly between the groups and with Mao et al. (1997)[11] who reported statistically significant improvements in glenohumeral active range of motion, and reappearance of the axillary recess in subjects managed with 12 to 18 sessions of physical therapy including joint mobilizations, and flexibility exercises.

Griggs et al. (2000)[6] reported that following a physical therapy program consisting of mobilization (forward elevation, external rotation, horizontal adduction, and internal rotation) at a mean follow-up of 22 months, patients demonstrated a reduction in pain score, improvements in active range of motion, and 64 patients (90%) reported a 'satisfactory outcome'.

Jürgel et al. (2005)[8] examined the effect of rehabilitation on shoulder function in frozen shoulder patients and they found a marked shoulder active range of motion deficit was observed before rehabilitation.

The results of the present study showed that high grade mobilizing technique were more effective than low grade mobilizing technique in increasing daily activities, recreational and athletic, and work abilities. This results agreed with Vermeulen et al. (2000)[17] who reported that patient's subjected to high grades mobilization techniques demonstrated clinically significant improvements in joint ROM, pain, and activities of daily living and with Vermeulen et al. (2006)[18] who proved that high grades mobilization techniques was superior to low grades mobilization techniques for all outcome measures; improvement of active external rotation and reduction in shoulder disability as measured with the SRQ and the SRQ was significantly greater in the HGMT group than in the LGMT group over the total period of 12 months.

In contrast to this result Van den Hout et al. (2005)[16] stated that no statistically significant difference in high-grades mobilization techniques (HGMT) versus low-grades mobilization techniques (LGMT) in regaining glenohumeral joint mobility and improving overall function, and also that they required less treatment sessions.

Maricar and Chok et al. (1999)[12] reported the application of Maitland grade III and IV mobilizations, which appear to have

intensities similar to those of the mobilization techniques used for the HGMT group in the present study. However, the results of their study were not expressed in terms of absolute data regarding the baseline situation and changes over time.

Conclusion

In summary, high grade mobilizing technique proved to be more effective than low grade mobilizing technique in the management of adhesive capsulitis of the shoulder; however, subjects improved significantly with both treatment strategies, but the differences were noticeable.

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