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RESEARCH ARTICLE

MAITLAND TECHNIQUE VERSUS SCAPULAR TRIGGER POINTS RELEASE IN TREATMENT OF SHOULDER ADHESIVE CAPSULITIS.

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Abstract

Shoulder adhesive capsulitis is characterized by pain, limited shoulder elevation and loss of function. The purpose of this study was to determine the efficacy of Maitland technique, added to home exercises program versus scapular trigger points release added to the same home exercises program in treatment of shoulder adhesive capsulitis, by measuring pain, range of motion of shoulder flexion and functional activities. Thirty patients were randomly assigned into two groups of 15 patients who received either Maitland technique or scapular trigger point's release, three times a week for 6 weeks. Visual analog scale, American shoulder and elbow scale (ASES), active goniometric flexion range of motion (ROM) measures by OB goniometer were recorded pre-and post-treatment. Significant improvement was found within groups comparing pre- to post test scores of pain, function and flexion range of motion. Non-significant differences were found between the groups comparing each of the variables. In conclusion, the results of this study suggest that either Maitland technique or scapular trigger points release are equally effective interventions for use in patients with shoulder adhesive capsulitis.

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Introduction:-

Shoulder adhesive capsulitis (frozen shoulder) is a term used to describe a stiff shoulder joint that has temporarily lost the ability to move freely, most people with frozen shoulder have difficulty reaching overhead and reaching to the low back. Shoulder stiffness is the body's natural response to inflammation that develops in the shoulder capsule. Stiffness is a protective reflex that protects the shoulder from further injury (*Hand et al., 2007*).

Myofascial tightness and muscular adhesions contribute to prevention of necessary scapular upward rotation and create a mechanical block of humeral elevation; these restrictions can be decreased by myofascial release techniques. Myofascial trigger points are present in these specialized soft tissue restrictions, this prevent smooth muscle contraction throughout the length of the muscle. One of the myofascial release techniques is trigger points release, that is a very effective manual therapy used for release of the trigger points, yet little research addresses its use in shoulder rehabilitation protocols (*Michelle & McLeod, 2007*).

Many references recommended the use of joint mobilizations in rehabilitation of various injuries (*Michener et al., 2004; Rundquist & Ludwig, 2005; Vermeulen et al., 2000; Yang et al., 2007*). Mobilization techniques are important to regain the normal extensibility of the shoulder capsule and tight soft tissues (*Vermeulen et al., 2006*). So that, the use of intensive mobilization techniques may help to decrease the risk of further stiffness of the joint and contracture progression in patients with adhesive capsulitis.

Due to the need for documented research on various manual therapy techniques, this study was designed to compare the effect of Maitland technique and scapular trigger points release; on pain, range of motion of shoulder flexion and functional activities, in cases of shoulder adhesive capsulitis.

Patients and methods:-

This study was conducted in the outpatient clinic of faculty of Physical therapy, Cairo University. The study was conducted on thirty patients (26 females and 4 males) with unilateral idiopathic sub-acute or chronic shoulder adhesive capsulitis, their ages ranged from 40-60 years. Patients were divided into two groups. Group (A); consisted of 15 subjects who received Maitland technique combined to a home program of therapeutic exercises, for 18 sessions. Group (B); consisted of 15 subjects who received scapular trigger points release technique combined to the same home program of therapeutic exercises used in group (A), for 18 sessions.

Inclusion criteria were: (1) painful stiff shoulder for at least 3 months, (2) limited ROM of a shoulder joint (shoulder flexion loss of 25% or greater compared with the noninvolved shoulder. Exclusion criteria was: (1) diabetes mellitus, (2) a history of shoulder surgery, (3) rheumatoid arthritis, (4) a painful stiff shoulder after a trauma, (5) fracture of the shoulder complex, (6) rotator cuff rupture, or (7) tendon calcification.

Instrumentation:-

- **Visual analog scale:**

The visual analog scale (VAS)(appendix A) is self-report pain assessment scale. The VAS is usually based on a 10 cm line, which is label with descriptors at the extremes of the line. The patient marks on the line at the point that best represents the pain level.

OB "MYRIN" Goniometry:-

The OB goniometer was used for assessing shoulder flexion range of motion (ROM). The OB goniometer consists of a fluid-filled container mounted on a plate. The container has a compass needle that reacts to the earth's magnetic field, and an inclination needle that is influenced by the force of gravity. There is a Velcro strap is applied to the limb segment immediately distal to the joint being assessed (figure 1).



Figure (1). OB "MYRIN" Goniometry

- **American shoulder and elbow surgeons (ASES) rating scale:**

This scale assesses the functional level of the shoulder, The ASES score consists of four parts which are pain, functional activities, strength and stability. Each part had its own score (pain = 5, functional activities = 60, strength = 20 and stability = 15) and the total score = 100 (appendix B).

Treatment:-

- **Maitland mobilization:-**

The techniques were performed as described by *Vermeulen et al., 2000* and *Maitland,(1983)*. The humerus was brought into a position of maximal flexion in the sagittal plane. The therapist applies a grade I traction to the glenohumeral joint while gliding the humerus in a posterior direction. The duration of prolonged stress varied according to the patient's tolerance. Ten to fifteen repetitions were performed.

- **Scapular trigger points release:-**

This technique is designed to mobilize myofascial restrictions on all three borders of the scapula;

- **Medial Border:** To release trigger points between the scapula and the thoracic spinous processes (levator scapula and rhomboids).
- **Upper Border:** To release the upper trapezius.
- **Lateral Border:** To release the infraspinatus.

- **Home program:-**

Pendulum circular swings were repeated 30 times. Wand exercises of shoulder flexion, extension, horizontal abduction, internal and external rotation, were also applied, and each exercise has been repeated ten times in each session.

Results:-**Sample characteristics (Group A):-**

Group (A) consists of 13 female and 2 male. Ten patients have affected right shoulder and five patients have affected left shoulder. The mean age of group (A) was 52.46 years, with a standard deviation of 6.46, the minimum age was 40 years, and the maximum age was 60 years.

Statistical analysis of the measured variables in group (A):-

Table (1) shows the mean value of the visual analogue score (VAS) in group (A). It was 7.66 (\pm 0.81) at the pre-treatment evaluation, then decreased significantly at the post-treatment evaluation to 2.22 (\pm 0.94). It also shows the mean value of American Shoulder and Elbow Surgeons (ASES) rating scale in group (A). It was 45.60 (\pm 6.55) at the pre-treatment evaluation, then increased significantly at the post-treatment evaluation to 91.66 (\pm 2.94). It also shows the mean values of the range of motion (ROM) of active shoulder flexion in group (A). It was 61.33 (\pm 18.51) at the pre-treatment evaluation, then increased significantly at the post-treatment evaluation to 85.26 (\pm 4.66).

Table (1): Mean and standard deviation of the measured variables, in group (A).

<i>Variables</i>		Mean	Standard deviation
VAS	Pre-treatment	7.66	0.81
	Post-treatment	2.2	0.94
ASES	Pre-treatment	45.60	6.55
	Post-treatment	91.66	2.49
ROM	Flexion	61.33	18.51
		85.26	4.66

Comparison of the pre-treatment with the post-treatment values of group (A):-

Wilcoxon signed ranks test: This test has been used for comparison of the pain intensity and the functional scale values (non-parametric test). Table (2) shows a significant difference between the pre-treatment and post-treatment values of the pain intensity. It also shows a significant difference between the pre-treatment and post-treatment values of the functional scale.

Paired t-test: Paired t-test has been used for comparison of the range of motion values (parametric test). Table (2) shows a significant difference between the pre-treatment and post-treatment values of the range of motion of active shoulder flexion.

Table (2): Comparison between the pre-treatment and post-treatment results of the VAS, ASES and Flexion ROM, in group (A).

Variables	Mean difference	Z -Value	Significance
VAS	5.46	-3.44	0.001
ASES	-46.06	-3.41	0.001
Variables	Mean difference	t -Value	Significance
Flexion	-23.93	-5.95	0.001

P < 0.05

Sample characteristics (Group B):-

Group (B) consists of 13 female and 2 male. Eight patients have affected right shoulder and seven patients have affected left shoulder. The mean age of group (B) was 53.20, with a standard deviation of 7.18, the minimum age was 40 years, and the maximum age was 60 years.

Statistical analysis of the measured variables in group (B):-

Table (3) shows the mean value of the visual analogue score (VAS) in group (B). It was 7.4 (\pm 1.18) at the pre-treatment evaluation, then decreased significantly at the post-treatment evaluation to 1.86 (\pm 1.18). It also shows the mean value of American Shoulder and Elbow Surgeons (ASES) rating scale in group (B). It was 48.60 (\pm 9.21) at the pre-treatment evaluation, then increased significantly at the post-treatment evaluation to 91.26 (\pm 4.63). It also shows the mean values of the range of motion (ROM) of active shoulder flexion. It was 66.80 (\pm 16.45) at the pre-treatment evaluation, then increased significantly at the post-treatment evaluation to 86.60 (\pm 3.85).

Table (3): Mean and standard deviation of the measured variables, in group (B).

Variables		Mean	Standard deviation
VAS	Pre-treatment	7.4	1.18
	Post-treatment	1.86	1.18
ASES	Pre-treatment	48.60	9.21
	Post-treatment	91.26	4.63
ROM	Flexion	Pre-treatment	66.80
		Post-treatment	86.60

Comparison of the pre-treatment with the post-treatment values of group (B):-

Wilcoxon signed ranks test: Table (4) shows a significant difference between the pre-treatment and post-treatment values of the pain intensity. It also shows a significant difference between the pre-treatment and post-treatment values of the functional scale.

Paired t-test: Table (4) shows a significant difference between the pre-treatment and post-treatment values of the range of motion of active shoulder flexion.

Table (4): Comparison between the pre-treatment and post-treatment results of the VAS, ASES and Flexion ROM, in group (B).

Variables	Mean difference	Z -Value	Significance
VAS	5.53	-3.47	0.001
ASES	-42.66	-3.41	0.001
Variables	Mean difference	t -Value	Significance
Flexion	-19.80	-4.70	0.001

P < 0.05**Comparison between the pre-treatment values of both groups:-**

Mann-Whitney Test: The test has been used to compare between the pre-treatment mean values of pain intensity in both groups to ensure that there was homogeneity between these pre-treatment values. The same was done for American Shoulder and Elbow Surgeons (ASES) rating scale (non-parametric test). Table (5) shows that there was no significant difference between both groups, at the pre-treatment evaluation concerning, each of these two dependant variables.

Independent t-test: the test has been used to compare between the pre-treatment mean values of the range of motion of active shoulder flexion range of motion (ROM) in both groups (parametric test). Table (5) shows that there was no significant difference between both groups at the pre-treatment evaluation.

Table (5): Pre-treatment comparison between the VAS and ASES and Flexion ROM, of both groups (A and B).

Variables	Mean difference	Z -Value	Significance
VAS	-0.26	-0.60	0.54
ASES	3	-0.64	0.51
Variables	Mean difference	t -Value	Significance
Flexion	5.46	0.85	0.40

P < 0.05**Comparison between the post-treatment values of both groups:-**

Mann-Whitney Test: The test has been used to compare between post-treatment mean values of pain intensity and ASES of both groups.

Independent t-test: The test compared between the post-treatment mean values of the shoulder flexion ROM of both groups. Table (6) shows that, no significant difference was obtained between both groups; concerning the pain intensity, ASES and shoulder flexion ROM.

Table (6): Post-treatment comparison between the VAS and ASES of both groups (A and B).

Variables	Mean difference	Z -Value	Significance
VAS	-0.33	-0.71	0.47
ASES	-0.40	-0.27	0.78
Variables	Mean difference	t -Value	Significance
Flexion	1.33	0.85	0.40

P < 0.05**Discussion:-**

The annual incidence of adhesive capsulitis is 3% to 5% in general population and up to 20% in people with diabetes (*Hand et al., 2007*). That is why adhesive capsulitis has been researched repeatedly over the years and patients with adhesive capsulitis have been treated with many different interventions. The purpose of this study was to compare the efficacy of Maitland mobilization versus scapular trigger points release in the treatment of shoulder adhesive capsulitis by measuring changes in shoulder pain, function, and shoulder flexion range of motion

This concept of reversing the effects of adhesive capsulitis using manual therapy was supported by the findings of this study. All measures demonstrated an improvement within each group from the data collected at the beginning of the study as compared to the data gathered at the end of the study. Therefore, both Maitland mobilization and scapular trigger points release appear to be effective treatments for patients with adhesive capsulitis.

The results showed that there was an increase in shoulder flexion using dorsal in gliding, which is supported by the work of *Hsu et al., (2002)* who stated that mobilization improved glenohumeral range of motion.

This study was also supported by the study of *Vermeulen et al., (2006)* who investigated the effect of end range joint mobilizations on increasing shoulder motion. The study included 100 participants with adhesive capsulitis of the shoulder, who received interventions of joint mobilization over the course of three months. Forty nine subjects received high grade joint mobilizations and 51 subjects received low grade joint mobilizations. The study defined high grade mobilizations as grades three and four joint mobilizations, and the low grade joint mobilizations as grades one and two joint mobilizations, according to Maitland. The subjects in both groups showed significant improvements regardless of the type of joint mobilizations used. The high grade mobilization group also had a greater increase in passive shoulder ROM when compared to the low grade mobilization group.

The effects of joint mobilization were investigated by *Yang et al., (2006)* who applied different combinations of mid-range mobilizations (MRM), end range joint mobilization (ERM), and mobilization with movement (MWM) for the treatment of shoulder adhesive capsulitis. MRM were defined as mobilization within the available joint play of the joint and was the least effective for the treatment of shoulder adhesive capsulitis. The study showed a significant increase in arm elevation, humeral lateral rotation, and humeral medial rotation, this study supports the results found in our study.

The results achieved by *Ingber, (2000)*, concerning the decrease of pain intensity, the increase of shoulder range of motion and the improved function supports the results of our study, in the group of scapular trigger points release. *Ingber, (2000)*, used conservative care for shoulder impingement syndrome in tennis racquetball players; they were treated with subscapularis myofascial treatment using weekly sessions followed by therapeutic stretching. Patients had painful limited range of motion of shoulder before the treatment sessions. Significant improvement of pain intensity and range of motion was reported after 2-3 treatment sessions, and subjects had almost returned to painless function after the treatment sessions which were for six sessions. Thus; myofascial release has an effect on increasing active range of motion and decreasing pain, so that improving function (*Aaron & Robert, 2008*).

Exercises were added to the treatment as home program in both groups, as it is an effective strategy to stretch and strengthen the shoulder muscles affected by adhesive capsulitis. Pendulum exercises, as developed by *Codman, (1934)*, have remained a popular exercise regime as documented in many articles. The pendulum exercise is performed with the patient bent over at the waist or in the prone position with weight in the involved arm that is dangling in a relaxed position. The sway of the body may be used to passively swing the arm or the patient may actively move the arm in a comfortable range of motion. Gravity and the weight of the extremity produce joint distraction, which can be increased by the patient holding a small weight. The motions most commonly used are flexion-extension, horizontal abduction-adduction, and circular pattern.

Exercises that have been used in many researches are such as flexion, extension, and horizontal abduction, internal and external rotation (*Glockner, 1995; Kelly & Clark, 1995*). The general recommendation for the patient is to perform these exercises in a regular basis, in the form a program of stretching and strengthening exercises. These researches proposed that exercises should be practiced over a minimum of four weeks in effort to monitor improvement in range of motion.

This study is a short term effect study, so the data have been collected only during the period of the study. Long term effects have not been studied in the current study and follow up study is recommended to compare the long term effects of both techniques in cases of shoulder adhesive capsulitis.

Conclusion:-

From the findings of the current study we can conclude that both of Maitland technique and scapular trigger points release are very valuable in management of shoulder adhesive capsulitis.

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