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TO FIND EFFECTS OF MAITLAND MOBILIZATION TECHNIQUE ON GLENOHUMERAL JOINT VERSUS SHOULDER COMPLEX (AC JT, SC JT, ST JT, GH JT) IN PATIENTS WITH FROZEN SHOULDER.

Physiotherapy

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ABSTRACT

Background and purpose: Frozen shoulder is one of the most common conditions encountered by persons where there is global restrictions of the range of motion of shoulder joint There has been little evidence that alone GH mobilization is effective but shoulder complex mobilization will be more fruitful This is the comparative study to check whether GH joint mobilization alone is effective or whole shoulder complex (AC JT, SC JT, ST JT, GH JT) mobilization is effective.

Outcome measures:

1) SPADI: shoulder pain and disability index :- to assess the pain and disability of patient
2) VAS : visual analogue scale:- to asses pain

Method: 50 participants will be recruited for the study. All the participants will be screened for inclusion criteria. Participants following into inclusion criteria will then be divided into 2 groups

Group A: Glenohumeral joint mobilization along with general exercises and IFT

Group B: Shoulder complex mobilization along with exercises and IFT

Both groups will be treated for 4 weeks. All the participants of both the groups were then assessed for outcome measures pre and post intervention.

Result: Intragroup comparison of VAS and SPADI showed significant improvement in both the groups. But in intergroup comparison VAS with p=0.036 and SPADI with p=0.000, Group B showed significant improvement in improving function and reduction of pain in frozen shoulder.

Conclusion: The study concluded that both interventions: glenohumeral mobilization and shoulder complex mobilization are effective in improving function and reduction of pain, but statistically & clinically shoulder complex (AC,SC,ST,SC joint) mobilization are more effective than glenohumeral mobilization.

KEYWORDS

Maitland mobilization, shoulder complex, SPADI, VAS, IFT

1. INTRODUCTION

Frozen shoulder syndrome (FSS) is a condition of uncertain etiology characterized by a progressive loss of both active and passive shoulder motion[1].

The bones of the shoulder complex includes the bones of the shoulder girdle; the clavicle

And scapula; and the humerus, sternum, and rib cage (Fig.1.1) These bones form four typical joints: the glenohumeral (shoulder joint) sternoclavicular, acromioclavicular, and scapulothoracic joints. There is a fifth functional joint, the coracoacromial arch, which describes the region where the head of the humerus is covered by the acromion and the coracoacromial ligament .All these joints must be considered together in discussing the shoulder, as any motion of the glenohumeral joint also occurs at each of the other joints. The shoulder is the most mobile joint in the body with the least stability; therefore, it is one of the most frequently injured joints in the body.

The prevalence of frozen shoulder is estimated to be 2-5% of general population. The condition is most common in the 5th and 6th decades of life with the peak age in the mid fifties. Onset before age of 40 is rare. Women are more often affected than men. The non dominant shoulder is slightly more likely to be affected. In 6-17% of patients other shoulder affected within five years.[2]

Clinical syndrome includes pain, a limited range of motion (ROM), and muscle weakness from disuse. The natural history is uncertain. Some authors have argued that adhesive capsulities is a self-limiting disease lasting as little as 6 months; whereas other authors suggest that it is a more chronic disorder causing long-term disabilities.[3]

Pathogenesis of FSS is unknown, several authors10–13 have proposed that impaired shoulder movements are related to shoulder capsule adhesions, contracted soft tissues, and adherent axillary recess. Cyriax suggested that tightness in a joint capsule would result in a pattern of proportional motion restriction (a shoulder capsular pattern in which external rotation would be more limited than abduction, which would be more limited than internal rotation). Based on the absence of a significant correlation between joint space capacity and restricted shoulder ROM, contracted soft tissue around the shoulder may be related to restricted shoulder ROM.[5] Vermeulen and colleagues [6] indicated that adherent axillary recess hinders humeral head mobility, resulting in diminished mobility of the shoulder. Furthermore, they documented that abnormal scapular motion existed in patients with FSS despite improvement in glenohumeral motion following a 3-month period of physical therapy intervention.[7] apparently, impaired shoulder movements affect function. In longitudinal follow-up studies lasting from 6 months to 2 years[8] significant numbers of patients with FSS demonstrated moderate functional deficits

STAGES OF FROZEN SHOULDER (Fig: 1.2):

Stage 1 Freezing (stage of pain): Patient complains of pain with insidious onset, decreased movements, external rotation greatest followed by loss of abduction and then forward flexion, internal rotation least affected. This stage lasts for 10 to 36 weeks. Pain due to frozen shoulder is predominantly nocturnal and usually will not radiate below the elbow unlike in cervical spondylosis.

Stage 2 Frozen (stage of stiffness): In this stage pain gradually decrease and the patient complains of progressive stiff shoulder in a capsular form. Slight movements are present.

Stage 3 Thawing (stage of recover): Patient will have no pain and movements will have recovered but will never be regained to normal. It lasts for 6 months to 2 years. ADL is severely affected.

SCAPULOTHORACIC MOBILIZATION

Subjects lay on their sound side on the bed. The therapist stood before the patient's affected shoulder, placing the index finger of one hand under the medial scapular border, the other hand grasping the superior border of the scapula. The scapula was moved superiorly and inferiorly for superior and inferior glide, and then the scapula was rotated upward and downward for scapular rotation. Additionally, the physiotherapist put the ulnar fingers under the medial scapular border and distracted the scapula from the thorax. These patterns were chosen to increase scapular posterior tilt. Ten sets of 10 repetitions were applied, with rest intervals of 30 s between sets.

Glenohumeral Joint:
Antero –Posterior glide, Postero – Anterior glide,Caudal glide and Distraction or Lateral glide

Sternoclavicular Joint:
Antero – Posterior glide,Postero – Anterior glide, Caudal glide and Superior glide

EXERCISE THERAPY PROGRAMME FOR FROZEN SHOULDER

Intervention consisted of the Codman exercise [9], shoulder wheel exercises [10], self-stretching exercises [11], and finger ladder exercises [12], and self-stretching exercises (for improving abduction, flexion, external rotation, internal rotation, and horizontal adduction). For improving the abduction, patient was sitting with the side next to a table, the forearm resting with palm up and patient was asked to slide his or her arm across the table, remaining in this position for 10 seconds, relax in starting position, and repeat it for 10 times. Similarly for improving the flexion the client was asked to slide the forearm forward along the table, remain in this position for 10 seconds, relax in starting position, and repeat it for 10 times. For improving the lateral rotation, the client stood standing and facing a doorframe with the palm of the hand against the edge of the frame and elbow flexed 90.

INTERFERENTIAL THERAPY

Interferential electrotherapy (IFE) is a common physiotherapeutic treatment modality used in Western countries. Its high carrier frequency (around 4000 Hz) produces lower impedance to the skin and allows deeper penetration into tissue [13]. IFE predominately excites large-diameter nerve fibres and reduces the transmission of nociceptive signals through small-diameter nerve fibres to the spinal dorsal horn by pre synaptic inhibition [14], thus achieving pain modulation in the higher centre. Some studies have shown that IFE is effective in the management of various pain conditions [15].

2.NEED OF THE STUDY

Many studies have been done earlier to lay down physiotherapy protocol for frozen shoulder (shoulder joint).TENS, SWD; strengthening exercises etc. have been proved to be effective in improving pain in patient with frozen shoulder. Studies have also been done earlier on glenohumeral mobilization is effective for frozen shoulder, but no study until now has proved the effect of shoulder complex (GH, AC, SC & ST joint) mobilization in patient with frozen shoulder. Thus this study is done to rove the effect of shoulder complex mobilization on frozen shoulder.

3.OBJECTIVES

To see the effectiveness of Maitland mobilization technique on glenohumeral joint in patient with frozen shoulder

To see the effectiveness of Maitland mobilization technique on shoulder complex (AC, SC, ST, GH joint) in patient with frozen shoulder.

4.MATERIALS AND METHODS

1) **SOURCE OF DATA:** Parul Kesarba Hospital and Physiotherapy OPD under PASM.
2) **RESEARCH DESIGN:** Experimental Study

1) **SAMPLING:** Convenient sampling: All the subjects with pain in shoulder joint with diagnosis of Frozen Shoulder.

2) **SAMPLE SIZE:**30 participants were recruited for the study

3) **INCLUSION CRITERIA:**
1. Complaint of global restriction of range of motion of shoulder joint more than 2 months.
2. Age- 40 to 60 yrs.
3. Patient suffering from diabetes without neurological involvement.
4. Male and female both.

6) **EXCLUSION CRITERIA:**
1. History of fractures around shoulder joint.
2. Any inflammatory disorders around shoulder joint.
3. Any other musculoskeletal condition of the shoulder.
4. Any neurological involvement.

7) **OUTCOME MEASURES:**
1. SPADI (Shoulder pain and disability index): To assess pain and disability of patient.
2. VAS (visual analogue scale): To assess pain.

5.STASTICALANLYSIS

The subject for the study was selected from the Parul kesarba hospital and peripheral OPD under PASM. Patient with shoulder pain were assessed by the therapist. 46 subjects were chosen for treatment of shoulder pain. Out of 46, 2 subjects were excluded because some had injuries in shoulder and some had undergone surgeries following fracture. Those who fit to inclusion criteria were assessed and explained in details about the study and their role and importance of study.

All the patients were asked to give a written informed consent form. Once the consent was signed by the subjects they were distributed into 2 groups.

Each patient was assessed with SPADI for functional affection and VAS for pain.

Each group was given 3 types of exercises and IFT in common:
1. Codman's exercise
2. Wand exercise
3. Finger ladder exercise

Group 1:
Maitland mobilization of glenohumeral joint along with conventional physiotherapy
Maitland mobilization for glenohumeral joint
- **Postero – Antero glide --** To increase extension and external rotation
- **Antero – Postero glide –**
- To increase flexion and internal rotation
- **Caudal glide --** To increase abduction
- **Glenohumeral joint distraction**

Group 2:
Maitland mobilization of shoulder complex + conventional physiotherapy
- **Maitland mobilization for shoulder complex (GH, ST, SC, and AC joint)**

1. **Scapulothoracic joint --** To increase scapular motion of elevation, depression,
2. **Sternoclavicular joint**

- **Posterior glide --** To increase depression of the clavicle
  - o For Posterior glide: push with therapist thumb in posterior direction
  - o Superior glide: push with therapist index finger in a superior direction
- **Anterior glide --** To increase elevation of the clavicle Patient is in supine lying, with therapist fingers are place superior and thumb inferiorly around the clavicle.
  - o For Anterior glide: fingers and thumb lift the clavicle anteriorly.
  - o Caudal glide: finger press inferiorly.

3.Acromioclavicular joint (fig: 3.7)
- **Anterior glide--**To increase mobility of the joint.
  - o **Duration of treatment:** Alternatively 3 days per week for four weeks.
  - o **Repetition:** 15 glides-3sets

GENERAL EXERCISES:
Wand exercise: To initiate active assisted range of motion using a cane, wand in standing position. Motions typically performed are flexion, extension, abduction, internal and external rotation

Pendulum exercises:
In this patient is in standing with trunk flexed at the hips about 90^0.arm loosely hangs downward in a position between 60^0 and 90^0 elevation. A pendulum or swinging motion of the arm is initiated by having the patient move the trunk slightly back and forth..Motions of flexion, extension and horizontal abduction, adduction and circumduction can be done. If the patient experiences back pain over, use the prone position adding a weight to the hand causes a greater distraction force on GH joints.

IFT:

Instruction and warning: the patient is asked to keep the part still relaxed and to report if any increase of pain or other sensations immediately.

Preparation of the patient: the skin should be wash properly. The nature of the treatment and stability of the area all are explained to the patient. The duration of the treatment as well as any particular cooperation required is indicated.

Preparation of the part: The patient was made to sit on a chair well supported according to the area to be treated. The couplant should be applied on a skin surface.

Setting up: the patient should be place in comfortable position

Frequency: 80 to 120 H_z

Intensity: Just below the pain threshold

Time: 20 minutes**.**

Application: IFT was given in relaxed position, 4 suction type electrodes were placed around shoulder region in coplanar arrangement (3.10).

6. RESULT AND INTERPRETATION

As already mentioned out of 46 patients only 30 were falling inclusion criteria out of which only patients were included for the study as the rest were not willing to participate in the study.

Therefore the result presented here are of 30 patients of who 17 were females and 13 were males. All of these suffering from shoulder pain their main complain was pain during overhead activities, heavy weight lifting and also difficulty in daily activities because of pain and restricted ROM.

For statistical analysis data was collected before and after 4 weeks of intervention. VAS and SPADI both were assessed pre and post intervention

- Paired t-test was used for the comparison between the pre and post values of outcome measure within groups.
- Unpaired t-test was used for the comparison between the pre –post values of outcome measures between the groups. The significant level adopted for the statistical tests was < 0.05and CI was kept at 95%. All statistical tests were performed using SPSS Version 16 software.

Group		Pre		Post		T value	P Value
	Outcome	Mean	SD	Mean	SD		
A	VAS	7	1.04	3	0.82	11.35	0.000
	SPADI	92	6.28	40	3.50	45.15	0.000
B	VAS	7	0.59	2	0.65	27.88	0.000
	SPADI	90	3.48	24	4.70	48.17	0.000

INTRA GROUP ANALYSIS
REPRESENTS INTRA GROUP COMPARISION FOR VAS FOR GROUP A (paired T-test):

VAS: PRE POST COMPARISION (GROUP A)

The above table represents intra group comparison of VAS score for functional assessment in Group A. the comparison done through paired t-test. The P-value of Group A comparing pre and post treatment score of VAS is 0.000. The P value is <0.05 which shows that group A is significant in improving VAS score.

SPADI: PRE POST COMPARISION (GROUP A)

The above table represents intra group comparison of SPADI score for functional assessment in Group A. the comparison was done through paired t-test. The P-value of Group A comparing pre and post treatment score of SPADI is 0.000. The p value is <0.05which shows that group A is significant in improving SPADI score.

VAS: PRE POST COMPARISION (GROUP B)

The above table shows intra group comparison of VAS score for functional assessment in Group B. the comparison was done through paired t-test. The P-value of Group B comparing pre and post treatment score of VAS is 0.000. The P value is <0.05 which shows that Group B is significant in improving VAS score.

SPADI: PRE POST COMPARISION (GROUP B)

The above table shows the intra group comparison of SPADI score for functional assessment in Group B. the comparison was done through paired t test. The p value of Group B comparing pre and post treatment score of SPADI is 0.000. The p value is <0.05 which shows that Group B is significant in improving SPADI score.

INTER GROUP ANALYSIS
REPRESENTS INTER GROUP COMPARISION FOR VAS AND SPADI (INDEPENDENT T- TEST):

Outcome measure	Group	Mean	SD	t- value	P- value
VAS	A	3	0.82	2.201	0.036
	B	2	0.65		
SPADI	A	40	3.50	10.57	0.000
	B	24	4.73		

VAS: PRE POST COMPARISON BETWEEN GROUP A AND B

The above table shows the inter group comparison of post treatment VAS scores for functional assessment of Group A and B. the analysis was carried out by unpaired t-test. At baseline, the p value is < 0.05.It shows that there is no significant difference between the pre treatment scores of both the groups. Hence it is shows the groups are homogenous. The p value comparing post treatment score for Group A and B is 0.036 which is suggestive of significant improvement between groups.

SPADI: PRE POST COMPARISON BETWEEN GROUP A AND B

The above table shows the inter group comparison of post treatment SPADI score for functional assessment of group A and B. the analysis was carried out by unpaired t test. At baseline the p value is <0.05. It shows that there is no significance difference between the pre treatment scores of both groups. Hence it shows the groups are homogenous. The p value comparing the post treatment score for Group A and B is 0.036 which is suggestive of significant improvement between groups.

7. DISCUSSION

This study is done to investigate that whether Shoulder girdle mobilization(AC,SC,ST,GH joint) for shoulder muscles when combined with IFT and general exercises helps in improving pain and quality of life in patients with frozen shoulder.

Glenohumeral mobilization has recently received increased interest as an effective in expensive and non invasive treatment in frozen shoulder due to inability to reduce pain and improve muscle strength.

In spite of growth of new techniques in physical therapy like shoulder girdle mobilization (AC,SC,ST,GH joint), still we are unaware of its effect as a treatment for frozen shoulder with advancement in technology.

The novelty of this study is to focus on helping patient with frozen shoulder using shoulder complex mobilization(AC,SC,ST,GH joint) as a new treatment which will help them in reducing pain, improving muscle strength and improving functional disabilities caused due to frozen shoulder.

This study also focuses on creating awareness among physical therapist to use shoulder complex mobilization (AC, SC, ST, GH joint) as a part of treatment protocol while addressing patient with frozen shoulder.

The prevalence of frozen shoulder is estimated to be 2-5 % of general population. The condition is most common in 5th and 6th decades of life with the peak age in the mid fifties. Onset before age of 40 is rare. Women are more often affected than men. The non dominant shoulder is slightly more likely to be affected. In 6-17 % of patients other shoulder affected within 5 years.

In my study pain was assessed using visual analogue scale (VAS) and shoulder pain and disability index (SPADI). SPADI also assessed functional disabilities of patient.

According to intragroup analysis: significant less than 0.05 seen in both groups but group B is highly significant according to mean of VAS and SPADI, according to intergroup analysis: significant less than 0.05 seen in both groups but SPADI is highly significant than VAS

So more improvement seen in group B according to intragroup analysis. And according to intergroup analysis more improvement seen in SPADI.

Previous study found that shoulder girdle mobilization (AC, ST, SC, GH joint) when used is effective in decreasing pain increasing range of motion and improving function in subjects with frozen shoulder. Since majority of middle age people suffers from frozen shoulder, further study should investigate the best intensity and the rate of progression of exercise program for frozen shoulder. Also which specific exercises should be avoided or modified to provide relief from frozen shoulder.

8.CONCLUSION

The final conclusion of the study is that, both the groups i.e., GH mobilization and Shoulder complex mobilization group showed significant improvement in function and pain reduction but, when Shoulder complex mobilization was compared to GH mobilization group, the patient with frozen shoulder showed more significant functional improvement and pain reduction in Group B rather than Group B.

This concludes that shoulder complex mobilization is more effective than Glenohumeral mobilization in reducing pain and improving function.

9. LIMITATION AND FURTHER RECOMMENDATION

Limitation

- The study was that the number of subjects recruited for the study were very few (30), 15 subjects in each group.
- The duration of the study was also very short to conclude that shoulder complex mobilization is more effective in reduction of pain and functional improvement than Glenohumeral mobilization in patients with frozen shoulder.
- Effectiveness of treatment and data collection methods may have affected the result of the study.
- The study duration was too short to conclude the long term effects of shoulder complex mobilization.
- Sampling was done as per convenience

Further recommendations:

- Further study can be done with larger number of subjects to prove the effectiveness of shoulder complex mobilization on frozen shoulder.
- Shoulder complex mobilization can be compared with other techniques to check whether Shoulder complex mobilization is really effective when compared to other physical therapy techniques.

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