EFFECTIVENESS OF SCAPULAR AND GLENOHUMERAL MOBILIZATION ON RANGE OF MOTION AND DISABILITY OF SHOULDER IN SUBJECTS WITH PERIARTHROPATHY OF SHOULDER

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ABSTRACT

Adhesive capsulitis has been the more prevalent condition to cause the upper limb disability to the patient mostly in activities of daily living, like overhead activities, putting on clothes, which is not enabling the person to interact socially in well manner.

Isolated and comparative studies were done in scapular mobilization and glenohumeral mobilization. Hence the purpose of this study is to know the combined effect of scapular and glenohumeral mobilization on (SPADI) and ROM in periartroption of shoulder.

Aim of the study:-
To find out the effectiveness of scapular and glenohumeral joint mobilization on pain and ROM in periartrosis of the shoulder.

Objectives of the study:
- To determine the effect of scapular and glenohumeral mobilization on SPADI in periartrosis of shoulder.
- To determine the effect of scapular and glenohumeral mobilization on ROM in periartrosis of shoulder.

Methodology:
A total 30 subjects were included in the study with the age group of 40 to 65 years they are evaluated and diagnosed as periartrosis of shoulder by orthopaedicians from BIRRD and RUYA are referred to physiotherapy department. All the subjects were screened for inclusion and exclusion criteria after finding their susceptibility informed consent was taken. Initially baseline values of demographic details like age, SPADI, ROM of shoulder, lateral scapular slide test was taken. Initial first 2 weeks given glenohumeral mobilization along with ultrasound and then next 2 weeks given scapular and glenohumeral mobilization long with ultrasound and then post values of shoulder ROM,SPADI, lateral scapular slide test was taken.

Result:
The pre, 2nd and 4th weeks experimental mean values, t-test and p values of all the outcomes that is shoulder ROM,SPADI,LSST shows significance(0.05) in pre, 2nd wk and 4th week but more significance seen in 2nd and 4th week.

Conclusion:
Hence, the study concludes that scapular and glenohumeral mobilization to be more effective than glenohumeral mobilization on reducing pain and disability on SPADI, improving range of motion in periartrosis of shoulder.

KEYWORDS:

INTRODUCTION

Periarthritis (PA) of shoulder is defined as an idiopathic condition of the shoulder characterized by the spontaneous onset of pain in the shoulder, gradual loss of active and passive shoulder range of motion resulting from fibrosis and contracture of joint capsule[1].

In 1934 Codman first introduced the term frozen shoulder. He described frozen shoulder as a painful condition associated with stiffness and difficulty in sleeping on the affected side, marked reduction in forward elevation and external rotation that are the hallmarks of the disease. In 1945, Naviesar coined the term adhesive capsulitis.[2]

PA is the third most frequent musculoskeletal complaint, it affects 2-5% of the general population and 10-20% of people with diabetes[3,4].

Adhesive capsulitis is mainly classified in to two types primary and secondary. Primary or idiopathic adhesive capsulitis occurs spontaneously without a specific precipitating event. It may result from a chronic inflammatory response with fibroplastic proliferation which may actually be an abnormal response from immune system. Secondary adhesive capsulitis occurs after a shoulder injury or surgery or may be associated with another condition such as dislocation, avascular...
necrosis and cerebrovascular accident.

There are commonly 3 stages of periarthritis of shoulder [5].

Painful stage: in which there is pain in both active and passive motion which is diffuse and lasts one to two months.

Frozen shoulder: Gradual loss of range of motion which persists from several months to years with minimal pain throughout the range except at the end range of motion.

Thawing stage: the range of motion (ROM) improved over the several months to years.

The condition is characterized by thickening of the synovial capsule and adhesions within the subacromial or subdeltoid bursa, adhesion to the biceps tendon and or obliteration of the axillary fold secondary to adhesion which results an insidious and progressive loss of active and passive mobility in the glenohumeral joint due to joint contracture[6].

Although adhesive capsulitis is generally considered to be self-limiting condition that can be treated with physical therapy to regain the normal extensibility of the shoulder capsule, passive stretching of the shoulder capsule by means of mobilization technique [7].

Grade 1 and 2 of Maitland mobilization techniques are primarily used for treating joints limited by pain. The oscillations may have an inhibitory effect on the perception of painful stimuli by repetitively stimulating mechanoreceptors that block nociceptive pathways at the spinal cord or brainstem levels. These non stretch motions help move synovial fluid to improve nutrition to the cartilage where as grade 3 and 4 are primarily used as stretching maneuvers. Appropriate selection of mobilization techniques for treatment can only take place after a thorough assessment and evaluation.

Elevation of the upper extremity (about 180 degree with trunk rotation) refers to combination of scapular, clavicular and humeral motion that occurs during arm movement. The scapula upward rotation linearly varies with humeral angle and contributes to approximately 30-40% of the overall arm elevation in adults, classically described as the scapulohumeral rhythm. The abnormal scapular biomechanics that occur as a result of dysfunction create abnormal scapular position that decrease normal shoulder function[1].

Therefore treatment of shoulder dysfunction should include scapular mobilization(sm) techniques. To perform full arm elevation in the scapular plane, coordination between the scapula thoracic and glenohumeral joint is important.

Scapular mobilization may break up adhesions and release these muscles. Hence scapular movement may be increased the improvement of shoulder movement might also be related to increased scapular movements.

Variety of physiotherapy intervention such as hot packs or application of interferential therapy, laser therapy, ultrasound therapy and Transcutaneous electrical nerve stimulation (TENS) were commonly used [4].

Application of ultrasound as a therapeutic modality has been practice since the 1940 s potential heating effect promotion of tissue relaxation, casing local blood flow, and breaking down of the scar tissue achieved through ultrasound therapy makes it a highly useful treatment mode in physiotherapy [8].

NEED OF THE STUDY:-

Adhesive capsulitis has been the more prevalent condition to cause the upper limb disability to the patient mostly in activities of daily living, like overhead activities, putting on clothes, which is not enabling the person to interact socially in well manner.

Isolated and comparative studies were done in scapular mobilization and glenohumeral mobilization. Hence the purpose of this study is to know the combined effect of scapular and glenohumeral mobilization on SPADI and ROM in periarthritis of shoulder.

AIM:-

To find out the effectiveness of scapular and glenohumeral joint mobilization on ROM and shoulder disability in periarthritis of shoulder.

OBJECTIVES OF THE STUDY

- To determine the effects of scapular and glenohumeral mobilization on SPADI in subjects with periarthritis of shoulder.
- To determine the effects of scapular and glenohumeral mobilization on ROM in subjects with periarthritis of shoulder.
- To determine the effects of scapular and glenohumeral mobilization on LSST in subjects with periarthritis of shoulder.

MATERIALS AND METHOD

Materials used:-Inch tape
Goniometer
Ultrasound
SPADI sheet
Couch

Study design :- cross sectional study
Sample size :- The study includes 30 subjects
Study duration :- 4 weeks
Study setting :- In the SVIMS university.
Criteria for selection:

**Inclusive criteria:**
- Age group between 40-65 yrs
- Shoulder pain more than 3 months
- Shoulder Rom restriction

**Exclusive criteria:**
- Rotator cuff injury
- Rheumatoid arthritis
- Osteoarthritis
- Cervical spondylosis
- Any neurological deficits
- Any fractures around the shoulder
- Patients taking any steroids.

**Methodology:**

A total 30 subjects were included in the study with the age group of 40 to 65 years they are evaluated and diagnosed as periarthritis of shoulder by orthopaedicians from BIRRd and RUYA are referred to physiotherapy department. All the subjects were screened for inclusion and exclusion criteria after finding their susceptibility informed consent was taken. Initially baseline values of demographic details like age, SPADI ,ROM of shoulder, lateral scapular slide test was taken.

**GONIOMETRIC MEASUREMENT FOR SHOULDER ROM:**

- **FLEXION** – position of the subject in supine lying; greater tuberosity of the humerus is taken as the axis. Movable arm is placed over the midline of the lateral aspect of arm, stable arm is placed straight line to the movable arm and is kept in air without the subjects body contact.

- **EXTENSION** – position of the subject is sitting; greater tuberosity of the humerus is taken as the axis. Movable arm is placed over the midline of the lateral aspect of arm, stable arm is placed straight line to the movable arm and is kept in air without the subjects body contact.

- **ABDUCTION** – position of the subject is supine lying, axis is 1 inch below the acromion process of scapula. Movable arm is placed over the midline of the anterior aspect of arm, where as stable arm is placed horizontally on the clavicle.

- **EXTERNAL ROTATION** – position of the subject is supine lying with elbow 90 degrees. Olecranon process of the ulna is taken as axis. Movable arm is placed over the midline of the posterior aspect of forearm. Stable arm is placed straight line to the movable arm.

- **INTERNAL ROTATION** – position of the subject is supine lying with elbow 90 degrees. Olecranon process of the ulna is taken as axis. Movable arm is placed over the midline of the posterior aspect of forearm. Stable arm is placed straight line to the movable arm.

*Fig 5: Universal 180° Goniometer*

**Shoulder pain and disability (SPADI):**

It is a self administered instrument that measures pain and disability associated with shoulder disease.

It consists of 13 items divided into 2 subscales, pain (5
items) and disability (8 items)
The questions are asked, patient mark the responses where 0=no pain and 10=worst pain imaginable for 5 pain items.
For disability 0 =No difficulty and 10 =so difficult that he/she requires help
SPADI is scored 0 to 130 by averaging the scores from the two subscales [45].

Lateral scapular slide test:-
Inferior – medial angle of scapula is palpated and marked on both sides.
The reference point on the spine is nearest spinous process, which is marked
Distance is measured on both sides in three different positions [46].
A) At resting position
B) With hands on hips, with fingers anterior and thumb posterior
C) With arm at 90 degrees with internal rotation. [47]

INTERVENTION:-
Initially first two weeks only glenohumeral mobilizations and ultrasound given.
After two week’s scapular and glenohumeral mobilization and ultrasound given.
Ultrasound is given 3 days a week for 4 weeks.
Mode – continuous
Frequency – 1 MHZ
Intensity -1.5w/cm2
Duration -10 minutes.

Maitland mobilization for glenohumeral joint [30].
Glenohumeral distraction:-
Patient will be in supine lying position, distraction of the humeral head with respect to the glenoid will be performed by pulling the humeral head in the superior, lateral and anterior directions with a firm grip of both hands close to the humeral head.
Passive oscillatory movements were performed at the rate of 2-3 glides per second for 30 second for each glide and every glide was given for 5 sets. The technique was applied 5 days a week for 4 weeks.
Glenohumeral caudal glide:
Patient will be in supine lying position; the therapist will hold the affected arm in 90 degrees of abduction and will push the head of the humerus in inferior direction for the caudal glide.
Passive oscillatory movements were performed at the rate of 2-3 glides per second for 30 second for each glide and every glide was given for 5 sets. The technique was applied 5 days a week for 4 weeks.
Glenohumeral anterior glide:
Patient will be in supine lying position, therapist will hold the head of humerus on the affected side firmly, and will
apply on upward pressure on the head of the humerus posteriorly

Passive oscillatory movements were performed at the rate of 2-3 glides per second for 30 second for each glide and every glide was given for 5 sets. The technique was applied 5 days a week for 4 weeks.

**Glenohumeral posterior glide:-**

Patient will be in prone lying position therapist will hold the head of humerus on the affected side firmly and apply an upward pressure on the head of humerus from the anterior from the anterior side of humerus.

Passive oscillatory movements were performed at the rate of 2-3 glides per second for 30 second for each glide and every glide was given for 5 sets. The technique was applied 5 days a week for 4 weeks.

**Scapular upward rotation:-**

Scapular upward rotation was performed with the patient in side lying on unaffected side the therapist was placed her index finger of one hand under the medical border of the scapula and other hand grasping the superior border of scapula and then scapula was rotated upwardly

Passive oscillatory movements were performed at the rate of 2-3 glides per second for 30 second for each glide and every glide was given for 5 sets. The technique was applied 5 days a week for 4 weeks.

**Scapula download rotation:-**

Scapula download rotation was performed with the patient in side lying on unaffected side the therapist was placed her index finger of one hand under the medical border of the scapula and other hand grasping the superior border of scapula and then scapula was rotated downwardly

**Scapula distraction:-**

The patient was lying prone the therapist was put the palmar fingers under the medical scapular border and districed the scapula from the thorax (scapular tilt)

**STATISTICAL ANALYSIS AND RESULTS**

**Table 1:-Comparison of Mean values of flexion range of motion of shoulder between pre,2nd wk and 4th wk in pre and post treatment.**

<table>
<thead>
<tr>
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<td>16.05</td>
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</table>

Results:-pre and post values of flexion Rom in shoulder shows 104.00 ± 16.05 in pre,122.33 ± 13.88 in 2nd week.
and 162.67 ± 9.35 in 4th week. As p<0.05 there is a significant difference between the pre, 2nd and 4th week but more significance seen in 2nd and 4th week.

Graph 1: Graphical representation of comparison of mean values of flexion Rom of shoulder in pre, 2nd wk and 4th week.

### Table 2: Comparison of mean values of extension range of motion of shoulder pre, 2nd wk and 4th week in pre and post treatment

<table>
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<td>4th Wk</td>
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<td>4.81</td>
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</table>

Results: Pre and post values of extension range of motion of shoulder shows 21.67 ± 8.34 in pre, 30.83 ± 8.42 in 2nd week and 56.00 ± 4.81 in 4th week. As p<0.05 there is significant difference between the pre,2nd and 4th week but more significance seen in 2nd and 4th week.

Graph 2: Graphical representation of comparison of mean values of extension Rom of shoulder in pre, 2nd wk and 4th week.

### Table 3: Comparison of mean values of abduction range of motion of shoulder pre, 2nd wk and 4th week in pre and post treatment

<table>
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<td>8.67</td>
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<tr>
<td>PRE</td>
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Results: Pre and post values of abduction Rom in shoulder shows 26.17 ± 8.17 in pre, 34.83 ± 7.60 in 2nd wk and 67.17 ± 8.78 in 4th week. As p<0.05 there is significant difference between the pre,2nd, 4th week but more significance seen in 2nd and 4th week.

Graph 3: Graphical representation of comparison of mean values of abduction Rom of shoulder in pre, 2nd wk and 4th week.

### Table 4: Comparison of mean values of internal rotation range of motion of shoulder pre, 2nd wk and 4th week in pre and post treatment

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Results: Pre and post values of internal rotation Rom in shoulder shows 26.17 ± 8.17 in pre, 34.83 ± 7.60 in 2nd wk and 67.17 ± 8.78 in 4th week. As p<0.05 there is significant difference between the pre,2nd, 4th week but more significance seen in 2nd and 4th week.
Graph 4: Graphical representation of comparison of mean values of internal rotation Rom in shoulder in pre, 2nd wk and 4th week.

Table 5: Comparison of Mean values of external rotation of range of motion of shoulder in pre, 2nd wk and 4th week in pre and post treatment

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Results: Pre and post values of external rotation Rom in shoulder shows 22.83 ± 9.89 in pre, 33.33 ± 8.44 in 2nd wk and 65.83 ± 8.62 in 4th week. As p<0.05 there is significant difference in pre, 2nd, 4th week but more significance seen in 2nd and 4th week.

Graph 6: Graphical representation of comparison of mean values of pain in pre, 2nd wk, 4th week.

Table 7: Comparison of mean values of disability between pre, 2nd wk and 4th week in pre and post treatment

<table>
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Results: Pre and post mean values of disability shows 76.37 ± 7.83 in pre, 52.63 ± 6.74 in 2nd wk, 16.13 ± 3.30 in 4th week. As p<0.05 there is significant difference in pre, 2nd, 4th week but more significance seen in 2nd and 4th week.
Graph 7: Graphical representation of comparison of mean values of disability in pre, 2nd wk and 4th week.

Table 8: Comparison of mean values of lateral scapular slide test between pre, 2nd wk and 4th week in pre and post treatment

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</table>

Results: pre and post values of lateral scapular slide test shows 1.30 ± 0.31 in pre, 0.91 ± 0.30 in 2nd wk, 0.29 ± 0.16 in 4th week. As p<0.05 there is significant difference in pre, 2nd, 4th week but more significance seen in 2nd and 4th week.

Graph 8: Graphical representation of comparison of mean values of LSST in pre, 2nd wk and 4th week.

RESULT:

The pre, 2nd and 4th weeks experimental mean values, t-test and p values of all the outcomes that is shoulder Rom, SPADI, LSST shows significance(0.05) in pre, 2nd wk and 4th week but more significance seen in 2nd and 4th week.

DISCUSSION

The present study is carried out using scapular and glenohemeral mobilization along with pararthrits of shoulder. The age group subjects included in the study was more than 40 years females are more affected than male.

Initial first 2 weeks subjects received glenohumeal mobilization along with ultrasound and then next 2 weeks subjects received scapular and glenohemeral mobilization along with ultrasound. The result of present study shows that subjects in scapular and glenohemeral mobilization along with ultrasound showed there is significant reduction in pain and improvement in range of motion of shoulder and scapular dyskinesis when compared to glenohemeral mobilization along with ultrasound.

Mechanical force during mobilization may include breaking up of adhesion realigning collagen, or increasing fiber glide when specific movements stress the specific parts of the capsule further more mobilization techniques are supposed to increase or maintain joint mobility by inducing biological changes in synovial fluid enhanced exchange[6].

Mangus et al argue that joint mobilization controls pain through neurophysiological effect by stimulating type 2 mechanoreceptors while inhibiting type 4 nociceptors. Passive joint mobilization provokes golgi tendon activity at the end of the joint mobilization and causes reflex inhibition of the muscle[9].

Maitland’s rhythmic oscillations also have an effect on circulatory perfusion. The ongoing circulatory status may lead to ischemia and the potential for intraneural edema, inflammation, and fibrosis. Mobilization has an effect on fluid flow as blood flow in the vessels supplying the nerve fibers and synovial fluid flow surrounding the avascular articular cartilage. This, by a pressure gradient, is generated which helps in facilitating exchange of fluid, that is, increased venous drainage and dispersing the chemical irritants. This causes a reversal of the ischemia, edema, and inflammation cycle and reduces joint effusion and relieves pain by reducing the pressure over the nerve endings[6].

Abhay et al have concluded a clinical study to find the effectiveness of Maitland mobilization in the treatment of idiopathic shoulder adhesive capsulitis the study confirmed that combination of shoulder exercises and Maitland mobilization techniques results in relieving pain and improving Rom and shoulder function.

Pravin et al the study concluded that capsular stretching and Maitland mobilization are effective in reducing pain on vas, improving Rom and disability on SPADI in adhesive capsulitis, however Maitland mobilization appears to be more effective in improving glenohemeral mobility and reducing pain on VAS and improving disability as compared to capsular stretching.

Yang et al, 2007 found that end range mobilization...
techniques was effective in alleviating pain.[49].

Fayad fetal in this study of three dimensional scapular kinematics told that scapulohumeral rhythm of the affected shoulder is inversely related to severity of shoulder range of motion, increased scapular rotation is seen in frozen shoulder as a compensatory pattern.

Scapular mobilization may break up adhesions and release these muscles; hence scapular movement may be increased. The improvement of shoulder movement might also be related to increased scapular movement. It is accepted that the glenohumeral and scapulothoracic joints are in the closed kinematic chain. We assume that if glenohumeral mobilization improves shoulder movements and normalizes the scapulohumeral rhythm, scapular mobilization should improve shoulder movements, thus is related with our findings because of relation between shoulder and scapula[25].

Aydan aytar et al have concluded that SM may be a useful manual therapy technique to apply to participants with painful shoulder limitation to gain an initial improvement in shoulder Rom and function.

Robertson reported the usage of ultrasound therapy in treatment of patients with frozen shoulder according to him,active therapeutic ultrasound is used for treating people with pain and musculoskeletal injuries to promote soft tissue healing. Both thermal and non thermal effects of UST are proven beneficial in reducing inflammation and improve tissue extensibility[40]


CONCLUSION:-

Hence, the study conclude that glenohumeral mobilization are effective on reducing pain and disability on SPADI, improving range of motion in periarthritis of shoulder. However, scapular and glenohumeral mobilization to be more effective in improving range of motion, disability, reducing pain as compared with glenohumeral mobilization

LIMITATIONS AND RECOMMENDATIONS OF THE STUDY:-

Small sample size

Another limitation of the study considering both diabetic and non diabetic subjects which may effect the validity of the study.

The results cannot be generalized to individual age.

There is lack of control group.

We thus recommended future multi-centric studies with large sample size to further strengthen our study findings.

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