IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 6, Issue 6 Ver. VII. (Nov.- Dec .2017), PP 71-77
www.iosrjournals.org

The Effect of Cyriax And Myofascial Release In Adhesive Capsulitis - A Comparative Study

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Abstract
Background: *Adhesive Capsulitis is a very painful condition of the shoulder characterized by pain, severe stiffness and restriction of movements usually present in the sixth decade of life. Onset before the age 40 years is uncommon and the non dominant shoulder is slightly more likely to be affected. The purpose of this study was to compare the Cyriax soft tissue release and Myofascial Release technique along with conservative management in Adhesive Capsulitis on pain, disability and range of motion.*
Method: *This study has been conducted at out-patient department of Sardar Bhagwan Singh Post Graduate Institute of Biomedical Sciences and Research. 30 subjects were completed the study. The subjects were randomly assigned into two groups. Group A received Cyriax soft tissue release and Group B received Myofascial Release. The outcome measures of Shoulder pain and disability index (SPADI), shoulder disability questionnaire (SDQ) and range of motion(ROM) were used at baseline and after the treatment to document the changes. SPSS version 16 package software was used to analyze the data.*
Results: *Both the groups showed statistical significance on SPADI, SDQ and ROM (p <0.001). The pre and post mean difference of group B was greater than group A. Myofascial release showed more improvement in SPADI, SDQ and ROM*
Conclusions: *Myofascial release showed better results than cyriax soft tissue release along with conservative method on improving shoulder range of motion as well as in pain and disability in patients with adhesive capsulitis*
Keywords*: Adhesive capsulitis, Cyriax, Myofascial Release, shoulder pain and disability index, range of motion.*

Date of Submission: 01-12-2017 Date of acceptance: 18-12-2017

I. Introduction

Adhesive Capsulitis is an insidious painful condition with gradual restriction of all planes of movement in the shoulder[1]. Dupley [1872] is the man who first described the pain and stiffness of the shoulder joint as Humeroscapular Peri-arthritis , while Codman [1934] used the term Frozen Shoulder[2] and Nevasier was the first to identify the pathology through histological and surgical examination of frozen shoulder patients, he concluded that frozen shoulder was not periarthritis, but a "thickening and contraction of the capsule which becomes adherent to the humeral head" that he termed, "adhesive capsulitis."[3]

Adhesive capsulitis can be described as either primary (idiopathic) or secondary. Primary adhesive capsulitis results from a chronic inflammatory response with fibroblastic proliferation, which may actually be an abnormal response from the immune system and is characterized by fibrosis of the capsule resulting with progressive, painfull loss of active and passive shoulder motion and Causes of secondary adhesive capsulitis are of systemic, extrinsic, or intrinsic in nature. Systematic cause includes diabetes mellitus, thyroid dysfunction and hypoadrenalism. Extrinsic causes include cardiopulmonary conditions, cervical spine disease, stroke, parkinsons' disease and humerus fracture. Possible intrinsic factors are rotator cuff pathologies, biceps tendinitis, calcific tendinitis and acromioclavicular joint arthritis [4]. The cumulative incidence of adhesive capsulitis has been reported as 2.4 per 1000 people per year based on the presentation to Dutch general practice [3]. It occurs in the general population is 2-5% [5] and up to 20% in people with diabetes [6]. This condition most frequently affects persons aged 40-60 years and generally affects the women than in men and is somewhat more common in the non dominant arm [5]. The occurrence of adhesive capsulitis in unilateral shoulder increases the risk of contralateral shoulder involvement by 5% to 34% [6].

In 1987 Neviaser and Neviaser described four stages in the disease process. Stage 1 (inflammatory): The patient complains of pain with active and passive range of motion. The pain is described as an ache at rest and sharp with motion and is usually worse at night. Range of motion is still well maintained. These symptoms are usually present for less than 10 weeks. Intra-articular injection of local anaesthetic and a corticosteroid gives significant improvement in range of motion; Stage 2 ('freezing'): as the symptoms progress, pain becomes worse and range of motion become more resistricted. This phase lasts between 3 to 9 months and is characterized by an acute synovitis of the glenohumeral joint; Stage 3 ('frozen or stiffness'): during this stage use of the arm may be limited. The frozen stage lasts anywhere 4 to 12 months. The capsular pattern is reduced external shoulder rotation followed by shoulder flexion and external rotation; Stage 4 ('recovery or thawing'): this stage begins when range of motion begins to improve and this stage lasts from 12 to 42 months and is defined by gradual return of shoulder mobility[7].

Cyriax consisting deep transverse friction is also known as deep friction massage, popularized by James Cyriax. DTF is a specific type of connective tissue massage applied precisely to the soft tissue structure such as tendon, muscle bellies, musculotendinous junction, ligaments and joint capsules Transverse [1]. Massage is applied by the finger directly to the lesion and transverse to the direction of the fibres. The beneficial effects of deep friction massage include traumatic hyperemia, increased blood flow to the tissue, elimination of adhesion, stimulates phagocytosis and fiber orientation in regenerating connective tissue and also mechanoreceptor [8]. Myofascial Release is a very effective, gentle and safe hands-on method of soft tissue mobilization, developed by John Barnes that involves applying gentle sustained pressure to the subcutaneous and myofascial connective tissue [9]. The goal of myofascial release is to release fascia restriction and restore its tissue. This technique is used to ease pressure in the fibrous bands of the connective tissue, or fascia. Gentle and sustained stretching of myofascial release is believed to free adhesions and softens and lengthens the fascia. By freeing up fascia that may be impending blood vessels or nerves, myofascial release is also said to enhance the body's innate restorative powers by improving circulation and nervous system transmission. This low load sustained stretch gradually, over time, allow the myofascial tissue to elongate and relax, thus allowing increased range of motion, flexibility and decreased pain.

Many protocols have been advocated for the treatment of adhesive capsulitis, included heat or ice application, ultrasound therapy, interferential therapy, transcutaneous electrical nerve stimulation, active and passive range-of motion (ROM) exercises, proprioceptive neuromuscular facilitation (PNF) techniques, mobilization techniques, capsular distension, manipulation under anaesthesia and surgical capsular release, though only limited from randomized control trials are available[10] . Inspite of various approaches there is still lack of evidence about treatment that speed up recovery in patients with adhesive capsulitis. Two recent studies, one meta-analysis [3]and one survey [11] of physical therapy for treating adhesive capsulitis concluded that joint mobilization technique included maitland and mulligan are the most preferred manual therapy and least manual techniques are cyriax, myofascial release and muscle energy technique. Hence researchers have been looking for new approaches that are first and foremost, suitable for enhancing pain, disability and range of motion. Specifically, cyriax soft tissue release and myofascial release have been receiving attention in recent years especially for reducing pain and stiffness. Our main aim of the study was to examine the effects of DTF and MFR on pain , disability and ROM.

II. Materials and method

Participants

The study was conducted in the Outpatient department of Physiotherapy at Sardar Bhagwan Singh Post Graduate Institute, Balawala, Dehradun (India). Total 30 heterogenic populations were randomly selected. Age between 35-60 years, Shoulder pain of minimum 3 months duration, marked loss of active and passive shoulder range of motion and patients having diabetes were included. Patients with rotator cuff tear, any known systemic disorder, any neurological disorder or fracture in and around the shoulder were excluded from the study. The voluntary informed consent was obtained from each subject before participating into the study. All patients were selected randomly through lottery method using a random number table and divided into two groups presented in CONSORT (consolidated standards for reporting of trials) flowchart (fig 1). The pre and post evaluation of the shoulder active and passive range of motion, shoulder pain and disability index (SPADI) and shoulder disability questionnaire (SDQ) was carried out by a blinded observer at the beginning and at the end of the treatment session of the study.

Intervention Protocol

Prior to the manual therapy both the groups received 15 minutes of hot packs. Maitland graded oscillation technique (grades of glide was decided during treatment depending upon the patients symptoms, grade I and II for relieving pain in loose pack position and for spasm and grade III and IV in close position for

stretching and improving the range of motion), Codman pendulum exercise, finger ladder and capsular stretching exercise. All patients in the study were also instructed in a standardized home exercise program consisting active range of motion exercise and Codman pendulum exercises to be performed everyday at home. Concomitant use of NSAIDS or analgesics was not permitted throughout the study.

Group A- Deep Transverse Friction was administered to 15 patients at the bicipital groove and for Serratus Anterior muscle. Deep friction massage was given 15 minutes per session, three times a week for two week.
DTF at Bicipital Groove for the release of Anterior Capsule: Patient is positioned in supine lying, affected side on the edge of couch with elbow flexed at 90 degree. Therapist stands beside the patient's treating arm. Therapist thenar eminence of one hand on the anterior aspect of the affected shoulder and the other hand should hold the forearm in order to produce internal and external rotation. Therapist apply pressure while doing internal rotation of the shoulder by the other hand and pressure is released while doing external rotation .
DTF for Serratus Anterior muscle: Patient is positioned in side lying with affected side facing upwards. Therapist stands at the head end of the table. Therapist one hand passively retract the subjects affected shoulder to approximate the medial border of the scapula , creating the space between the medial border and thoracic cage and with the other hand therapist apply DTF in the space between the scapula and the thoracic cavity.

Group B- 15 patients were selected and were treated with Myofascial Release for Subscapularis, Serratus Anterior and for Pectrolis Major Muscle. 15-20 minutes treatment session was given every day for two week.
MFR for Pectoralis Major

Patient is positioned in the supine lying with shoulder is flexed up to 90 degree of abduction and approximately 30 degree of flexion in horizontal plane to avoid friction. The therapist stands at a 45 degree angle to the patient. The therapist grasps the pectoralis major muscle firmly between the thumb and fingers and gently lifted and taken away from the thorax and the movement can be directed towards caudal-cephalad and medial –lateral.

MFR for Subscapularis

Patient is positioned in supine lying with shoulder abducted from 90-120 degree, depending upon the restriction and comfort level of the patient. The therapist stands at the 45 degree at the head end of the patient. One hand of the therapist grasped the patient abducted arm to provide a slight traction-distraction force in order to bring the lateral border of the scapula outward and the palm of the other hand of the therapist is placed on the lateral border of the scapula as close to the gleno-humeral joint as possible and thumb of the same hand moves cranio-caudally over the anterolateral border of the scapula towards the inferior angle.

MFR for Serratus Anterior

The cross hand stretch technique was used to release the serratus anterior muscle. Patient is positioned in supine lying with shoulder abducted depending up on the restriction and comfort level of the patient. Therapist stands beside the patient. With cross hand therapist one hand over the lower ribs and other hand of the therapist lateral to the delto-pectoral fossa.

III. Statistical Analysis and Results

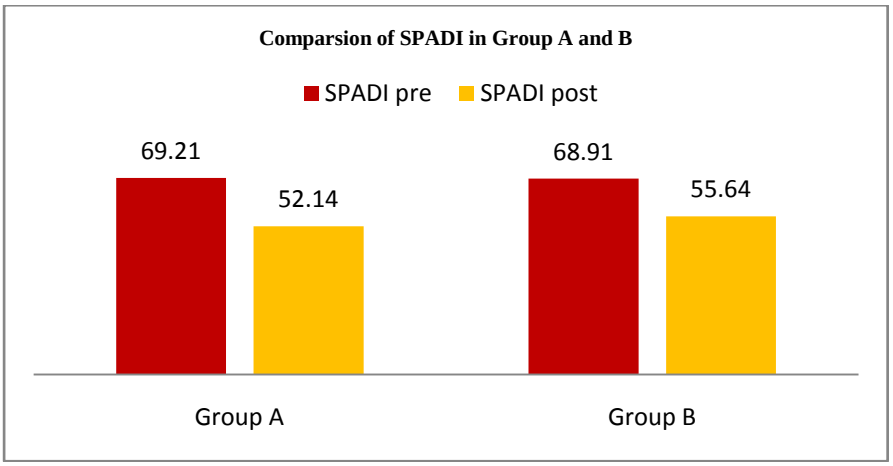
Statistical analyses were performed by SPSS statistics version 16. Prior to data analyses, all variables were subjected to the normality test. Descriptive statistics of the variables were presented in means and standard deviations. The effect of intervention between the groups were tested using a unpaired t-test and the within group differences were analyzed by paired t-test. That being said, the significance level was set at two sided P< 0.05 subsequently, the data are expressed as the mean ± standard deviation.

Table 1: Comparison of SPADI (pre and post) measurements of Group A and B

SPADI	Group A Mean ± SD	MD	Group B Mean ± SD	MD	p value
pre	69.2 ± 8.7		68.9 ± 10.2		0.9
post	52.1 ± 10.9	17.1	55.6± 11.0	13.3	0.3

Values are presented as the mean±standard deviation.
SPADI, Shoulder pain and disability index

Analysis of variance was used to compare difference between both the groups and differences was calculated using by unpaired t-test, P<0.001

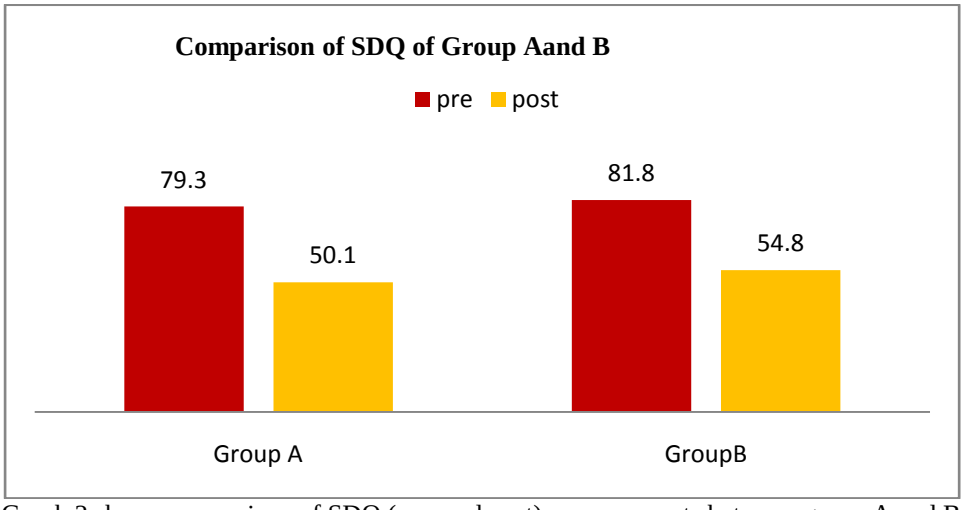


Graph 1 shows comparison of SPADI (pre and post) measurements between group A and B

Table 2 : Comparison of SDQ (pre and post) measurements of Group A and B

SDQ	Group A Mean ± SD	MD	Group B Mean ± SD	MD	p value
Pre	79.3 ± 16.2	29.2	81.8 ± 17.8	27	0.6
post	50.1 ± 19.0		54.8 ± 16.9		0.4

Values are presented as the mean±standard deviation.
SDQ, shoulder disability questionnaire
Analysis of variance was used to compare difference between both the groups and differences was calculated using by unpaired t-test, P<0.001



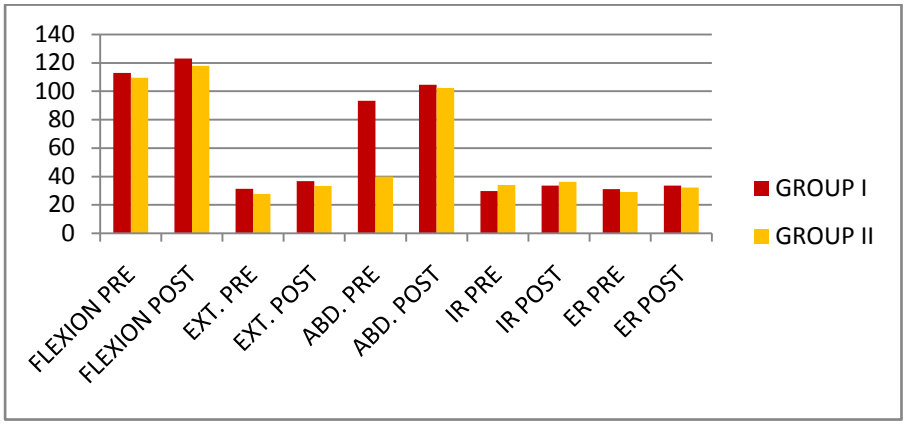
Graph 2 shows comparison of SDQ (pre and post) measurements between group A and B

Table 3 Comparsion of AROM (pre and post) score measurements Group A and B

S.no	ROM	Group A Mean ± SD	MD	Group B Mean ± SD	MD	p value
1	Flexion pre Flexion post	113.0 ± 24.3 123.0 ± 23.5	- 10	109.6 ± 29.4 11.8± 29.9	97.8	0.9 0.7
2	Ext. pre Ext. post	31.3 ± 6.9 36.6 ± 6.7	- 5.3	27.6 ± 13.2 33.3 ± 13.0	-5.7	0.5 0.6
3	Abd. pre Abd. post	93.3 ± 25.3 104.6 ± 24.3	-11.3	40.0 ± 12.5 102.3 ± 31.1	-62.3	0.0 0.7
4	IR pre IR post	29.6 ± 17.5 33.6± 17.2	-4	34.0 ± 20.0 36.3 ± 19.5	-2.3	0.6 0.6
5	ER pre ER post	31.0 ± 15.9 33.6 ±14.8	-2.6	29.0 ± 18.0 32.3 ± 17.8	-3.3	0.7 0.7

Values are presented as the mean±standard deviation.
AROM, active range of motion

Analysis of variance was used to compare difference between both the groups and differences was calculated using by unpaired t-test, P<0.001



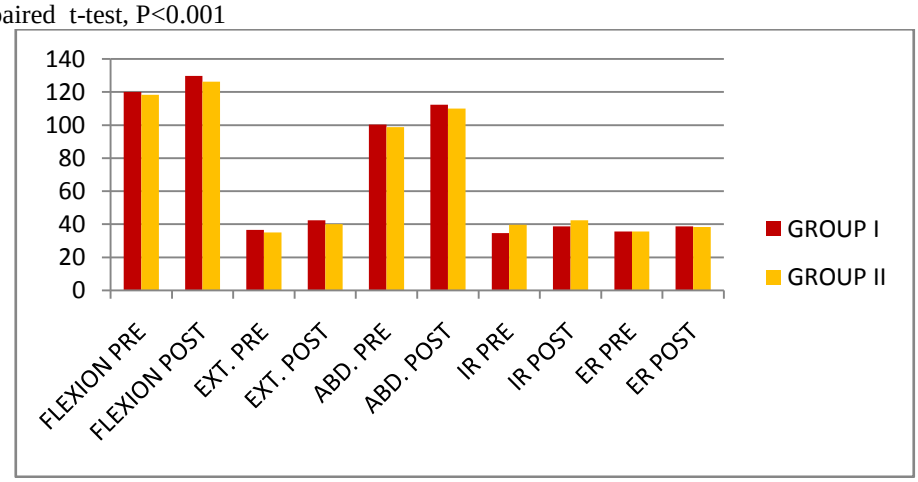
Graph 3 Comparison of AROM (pre and post) measurements between Group A and B

Table 4: Comparsion of PROM (pre and post) score measurements Group A and B

S. no.	ROM	Group A Mean ± SD	MD	Group B Mean ± SD	MD	p value
1	Flexion pre Flexion post	120.0 ± 24.2 129.6 ± 23.4	-9.6	118.3 ± 31.6 126.3 ± 30.9	-8	0.0 0.8
2	Ext. pre Ext. post	36.6 ± 6.4 42.3 ± 7.7	-5.7	35.0 ± 14.2 40.0 ± 12.5	-5	0.9 0.8
3	Abd. pre Abd. post	100.3 ± 25.4 112.3 ± 24.0	-12	98.6 ± 29.6 110.0 ± 31.6	-11.4	0.8 0.8
4	IR pre IR post	34.6 ± 18.1 38.6 ± 17.3	-4	39.6 ± 20.0 42.3 ± 20.1	-2.7	0.5 0.5
5	ER pre ER post	35.6 ± 16.5 38.6 ± 14.8	-3	35.6 ± 18.6 38.3 ± 19.4	-2.7	0.9 0.9

Values are presented as the mean±standard deviation.
PROM, passive range of motion

Analysis of variance was used to compare difference between both the groups and differences was calculated using by unpaired t-test, P<0.001



Graph 4 Comparison of PROM (pre and post) measurements between Group A and

IV. Discussion

The primary finding of this study showed that SPADI, SDQ and ROM were improved in response to DTF and MFR. Deep transverse friction causes traumatic hyperaemia, which helps to evacuate pain triggering metabolites. According to Cyriax, deep transverse friction massage restores mobility to the muscle in same way that mobilization frees a joint. Deep friction massage are intended to produce increases in range of motion on the basis of biomechanical effect which manifests itself when forces are directed towards resistance but within the limits of a subject's tolerance. The mechanical changes may include breaking up of adhesions, realigning collagen when specific movements stress the specific parts of the capsular tissue [9]

The study of Arora et al (2011) also states that DTF could give relief of pain and help in effective connective tissue repair by stimulating phagocytosis and regenerating connective tissue and also prevent adhesion formation and ruptures unwanted adhesions. The Improvements in pain scores and ROM observed DTF group could be due to post massage analgesic effect, modulation of non-nociceptive impulses at spinal cord level (Gate control theory) and inhibition of mechanoreceptors by rhythmical movements over the affected area, just closing the gate for afferents. Friction also leads to increase destruction of pain provoking metabolites (Levis's substances) whose presence in high concentration provokes ischemia and pain. Another reason for pain relief after prolonged deep friction to a localized area could be lasting peripheral nerve disturbance with local anaesthetic effects. The ROM improvement could be due to reduction in pain [12]

The positive effect in our study could be attributed to the nature of MFR technique, which is primarily to maximize improvement in flexibility and myofascial dysfunction. The study of Choie and Jung in 2015 states that Thoraco Lumbar Fascia release was effective in reducing shoulder pain and the degree of shoulder pain as indicated by SPADI measured after the intervention significantly differed from that before the intervention. MFR facilitates mechanical and neural responses, thereby enabling a hearing physiological adaptation of the fascia through the interface system[13]

The study of Kanase and Shanmugum in 2012 also supports the result that MFR and DTF along with conventional treatment the conventional approach showed extremely significant results in pain reduction and ROM improvement because: Joint motion/mobilization techniques help to relieve pain due to its neurophysiologic effect on the joint and also help to maintain extensibility of the articular and periarticular structures due to its biomechanical effect which is focused directly on the tension of periarticular tissue to prevent complications resulting from immobilization and trauma. Range of motion exercises also help to improve joint and soft tissue mobility to minimize loss of tissue flexibility and contracture formation. Stretching exercises given as home programme were also incorporated at the end range limits helping in breaking the collagen bonds and realignment of the fibres for permanent elongation or increased flexibility and mobility of the soft tissues that have adaptively shortened and become hypo mobile over time in Frozen Shoulder[6]

V. Conclusion

Cyriax soft tissue release and myofascial release, both the groups showed significant difference . But when both these groups were compared, Myofascial release showed better results than cyriax soft tissue release along with conservative method on improving shoulder range of motion as well as in pain and disability in patients with adhesive capsulitis.

Limitations.

Number of subjects was less; no groups has similar patients with same degree of involvement; age variations from there from 40-60 years; patients built was variable; study period is short and also and no follow up was taken.

Conflicts Of Authors- No potential conflicts of interest relevant to this study was reported.

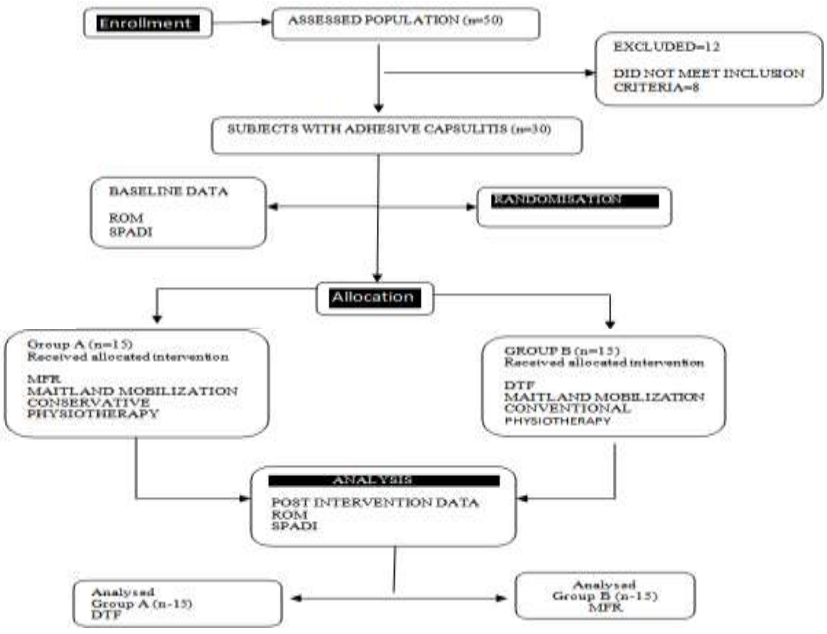


fig1: CONSORT (consolidated standards for reporting of trials) flowchart, DTF-deep transverse friction, MFR- ,myofascial release, SPADI- Shoulder pain and disability index, SDQ- shoulder disability questionnaire

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