

A COMPARATIVE STUDY BETWEEN DRY NEEDLING AND KINETIC CHAIN ACTIVATION TECHNIQUE WITH SPECIFIED EXERCISE PROGRAMME IN PAINFUL ARC SYNDROME

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ABSTRACT

Objective: Many researcher have reported that painful arc syndrome arises from multiple lesion i. e. minor tear of supraspinatus tendon, supraspinatus tendinitis, calcified deposit in the supraspinatus tendon, subacromial bursitis, crack fracture of greater tuberosity of humerus and bicipital tenosynovitis. In this study, dry needling and KCAT technique with specific exercise programme has been done to reduce pain and improve functioning and their by prevent shoulder pathologies. The objective of the study is. 1) To evaluate the effectiveness of kinetic chain activation in painful arc syndrome. 2) To evaluate the effectiveness of dry needling therapy in painful arc syndrome. 3) To evaluate the effectiveness of a specific exercise program.

Methods: 50 patient diagnosed with painful arc syndrome by the physiotherapy department orthopedic department OPD will be initially assessed for the inclusion or exclusion criteria. prior to the treatment procedure patients are oriented to the study and taken informed consent, patient is divided in to two groups(Group A and Group B) and both groups will be assessed for the pre-test parameter.

Outcome measure – shoulder pain and disability scale and goniometry is used for measuring pre-test and post-test.

Results: The study was significant in reducing pain level and improving function with the pretest. At the end of 6 w treatment program with, both group A (dry needling) and group B(KCAT) showed improvement in painful arc syndrome. Based on results, the study supports research hypothesis that there was a significant improvement in ROM and significant reduction in SPADI score associated with painful arc syndrome. Patient participated in group B shows more significant changes.

Conclusion: The study showed that significant improvement in symptoms of group B as compared to group A from the initial level to week 6. At the end of 6 w training programme both group A and group B Shows improvements in symptoms but the result of study supports that group B (KCAT CONCEPT-finger fanning technique) B is more efficient compare to group A(dry needling).

Keywords: KCAT-Kinetic chain activation technique, Dry needling, Painful arc syndrome

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INTRODUCTION

Shoulder pain is one of the most frequent musculoskeletal conditions and its prevalence estimates range from 7 to 34% for a particular condition [1, 2]. The shoulder joint is a ball and socket joint with the most extensive range of the human body perfectly synchronized action of the complex consisting of 4 different articulation is necessary for the optimal function of the shoulder joint. The components of shoulder joint are as follows 1. glenohumeral joint 2. Acromioclavicular joint 3. Sternoclavicular joint 4. Scapulothoracic joint. The multidirectional extensive range are result of the immaculate structural design of the shoulder complex. The glenohumeral joint is the point of articulation between the humerus and the scapula and thoracic cavity, with the latter occurring through the scapulothoracic articulation. the dynamic force and stability to this complex are provided by controlled muscular action the normal action of raising arm to vertical position overhead is carried out with smooth, uninterreped motion of all the joints of shoulder complex the synchronized action of shoulder complex is also known as scapulohumeral rhythm in the total arc 180° of elevation the glenohumeral joint contributes 120° and the remaining 60° is contributed by the rotation of scapula with the help of muscle action. Painful arc syndrome is characterized by pain referred to the upper arm in the region of the deltoid muscle and its insertion. The pain may be felt at the rest characteristically more at night and is typically exacerbated within a certain arc of movement. A painful arc between 60 to 120° of abduction indicates some disorder of the subacromial region [3, 4].

Compromised biomechanics behind painful arc syndrome shows the

space between the upper end of the humerus and the acromion gets compromised so that during mid-abduction, the tendons of the rotator cuff get nipped between the greater tuberosity and acromion.

Shoulder instability represents a spectrum of disorder resulting in shoulder dysfunction. Instability is classified as unidirectional or multidirectional. Scapulohumeral rhythm is the coordinated movement of the all 4 joint of shoulder complex the ratio of scapulohumeral rhythm 2:1 where the majority of movement occurs at GH joint. Loss of Scapulohumeral rhythm because of altered scapular physiology, biomechanics and kinetics may be secondary to painful condition of the shoulder.

In order to efficient the effective treatment plan a well-designed and structured rehab plan should provide to the patients we focused to analyse the effect of two very efficient method to i. e. dry needling or kinetic chain activation technique with a specialized exercise programme to gain full range of motion of shoulder without pain.

In recent times, there has been an increase in the use of dry needling is the part of comprehensive physiotherapeutic and conservative management. Dry needling is a minimally invasive procedure in which a monofilament or thin filiform filament needle is used to penetrate symptomatic soft tissue to reduce pain and disability [5, 6]. Needling procedure requires the basic technique of insertion of the needle; the insertion of the needle into the tissue, usually with some form of stimulation. Needling can be defined as superficial and deep needling depending on the depth of the needle insertion and it

can also be classified as trigger point dry needling [7, 8]. Myofascial trigger points are hyperirritable spots in the skeletal muscle accompanied by a palpable nodule that, when pressed, can produce local (active Trp) and referred (satellite Trp) [5, 7, 9]. There are several reasons that might be beneficial for the subacromial pain syndrome or painful arc syndrome mechanism of DN including various peripheral and central nervous system effects associated with pain modulation [7, 10].

The kinetic chain model a biomechanical model used to analyze many sports activities, depicts the body as a linked system of interdependent segments after working in a proximal to distal segment [11]. The proximal to distal sequence should be considered when attempting to restore function via a rehabilitation protocol [11]. The kinetic chain activation or upper limb chain activation with k-cat concept is a new intervention to improve functional movement. K-CAT concept is a fascial force transmission or force controlling method by the intervention of root cause analysis by either tensioning or relaxing of fascia, and integrating the functional movement of a natural fascial chain of the moving body. K-CAT involves finger fanning technique, which helps to restore the movement in terms of efficiency and optimization in both quantity of mobility and motility. This concept and the technique proposed that in the shoulder or upper limb the distal proximity has a control over proximal [12].

The shoulder pathology is the primary factor that determines therapeutic treatment. Traditional shoulder rehabilitation after injury includes a phase of rest, control of inflammation and isolated muscle strengthening [15, 16]. Additional components of the shoulder rehab program are scapular stabilization, proprioceptive and kinetic chain exercise. The active contractions of the muscle of shoulder are essential for maintain the dynamic stability of the shoulder complex and creates a wide variety of movements.

Therefore the study was designed to examine the effect of dry needling and KCAT with an exercise programme.

MATERIALS AND METHODS

Inclusion criteria

- Informed consent/willingness to participate in the study
- Age group 30-70
- Males and females with painful arc syndrome
- Diagnosed with special orthopaedic test (Empty Cane test, Drop Arm Test, Yergason's Test)

Exclusion criteria

- Patients with diabetes
- Patient with recent fracture/stress fracture
- Any unhealed wound present at the treatment site
- Age group less than 30 and more than 70
- Osteoporotic patient
- Patient on treatment or treated for cancer, rheumatoid arthritis, severe osteoporosis, acute neurological condition
- Reflex sympathetic atrophy
- Shoulder subluxation grade>II

Procedure

After collecting the written consent form, the patients selected by inclusion and exclusion criteria will be divided into two groups. – GROUP A and GROUP B

Pre-ROM, SPADI score and assessment of each patient was taken.

GROUP A were treated with dry needling technique and a specific exercise regimen.

Dry needling technique:- Subscapularis needling procedure

Patient position-patient is either. With the upper limb in a hammerlock position or supine with the upper limb in flexion.

Needle type-use 0.25*40 mm needle

Needling directions-with the patient scapula in a winged position, the therapist can direct the needle above and parallel to the costal bones, thereby avoiding the risk of pneumothorax.

The therapist can distract the scapula laterally with the patient's upper limb in flexion, the lateral aspect of subscapularis accessed by directing the needle towards the anterior surface of the scapula.

Latissimus dorsi needling procedure

Patient position-patient is supine, prone or side lying on the uninvolved shoulder.

Needle type-use 0.25 *40 mm needle.

Needling directions-the therapist uses a pincer grip, drawing the muscle laterally. The needle is directed in an anterior-to-posterior direction, away from the rib cage.

Trapezius needling procedure-

Patient position-patient is either supine or prone.

Needle type-use 0.25 *25 mm needle

Needling directions-needle in a lateral to medial direction, staying well above the apex of the lung and posterior to the brachial plexus

Pectoralis major needling procedure

Patient position-patient in supine position

Mobilise affected muscle part in a pincer grip

Infiltration/needling from anterior in direction of own finger

Treat medial parts strictly tangentially and vertically towards the rib.

Needle type-use 0.25*40 mm needle

Needle insertion-180° flat in the direction towards shoulder joint

Pectoralis minor needling procedure

Patient's position-patient is supine

Needle type-use 0.25 *40 mm needle

Needle directions-the pectoralis minor can vary from being a very meaty muscle to being nothing short of a membrane. The coracoid process must be identified so that the needle can be directed in an inferior direction in order to avoid the brachial plexus.

Group B were treated with finger fanning technique K-CAT concept and a specific exercise regimen.

Finger fanning technique

Starting position: Patient should be in relax sitting position with both feet in contact with ground, with extended elbow and flexed shoulder around 45-50° of flexion, which should be fully supported on the table.

Therapist position

Therapist seated in front of the patient and delivered finger fanning techniques.

Finger fanning technique

Therapist manoeuvre's the patient with his palms encapsulating patient palm, and instructs the patients to do finger fanning technique. During the fanning, the resistance offered by the therapist to the patients is distributed evenly across all the fingers, and this manoeuvre aids in improved proximal joint mobility due to the resistance or isotonic resisted working of fingers. The proximal work isometrically, hence results in change in length-tension relationship of entire myofascial force transmission system anterolateral and posteromedial, get activated.

Process

Ask the patient for finger fanning technique the palmar surface resting on the table with good contact with the below surface, if required, a pillow can be used for better contact.

Deltoid activation with sensory cues

Starting position: Patient should be in relax sitting position on patient stool/table with both feet in contact with ground

Therapist position-therapist should stand behind the patient

Process: Patient in a sitting position therapist provides sensory cues by tapping the deltoid (k-cat concept). Ask the patient to abduct the arm and the therapist should resist the movement by applying gentle pressure.

Repeat for 10-15 times

Both the group were treated with common specific exercise programme after the procedure. Exercise protocol and frequency of exercise

- Deltoid isometrics-anterior, middle and posterior fiber-(2-3 set of 5 repetitions)
- Scapular retraction with TheraBand-(2-3 set of 10 repetitions)
- Shoulder internal and external rotation with TheraBand-(2-3 set of 10 repetitions)
- Biceps curl with TheraBand-(2-3 set of 10 repetitions)

- Diagonal pattern TheraBand exercise -(2-3 set of 10 repetitions)
- Shoulder TheraBand triceps extension exercise-(2-3 set of 10 repetitions)

Data analysis and results

Study observed result and data showed that kinetic chain activation technique concept (finger fanning technique) with exercise regimen improve ROM and reduce pain and disability as more as compared to dry needling.

This study showed group B result were found better than group A result as data analysis showed shoulder abduction range of motion of group A mean±SD is 102.60±13.16 and improve to 167.40±6.10 in the post-test. Group B data of shoulder abduction range of motion pretest mean±SD is 103.40±12.31 and improve to 174.32±6.19 in post-post-test.

Data analysis of shoulder pain and disability index (SPADI) also significant for group B Compared to group A for group a pretest value of pain component is mean±SD is 40.36±4.02is reduced to 19.76±4.59 in the post-test. Disability component of group A pre-test mean±SD is 63.04±5.48 is reduced to 32.72±5.96 in post-test and the overall SPADI value of group A pre-test mean±SD is 103.40±8.74 is reduced to 52.48±9.62 in post test. The group B value of pain component pretest mean±SD is 36.16±6.34 is reduced to 12.28±3.96 in post test. Disability component of group B has a pre-test value of mean±SD is 59.84±7.40 is reduced to 19.80±6.01 in post-test and the total score of shoulder pain and disability index of group B value pre-test mean±SD is 96.00±13.13 is significantly reduced to 32.08±9.58 in post-test.

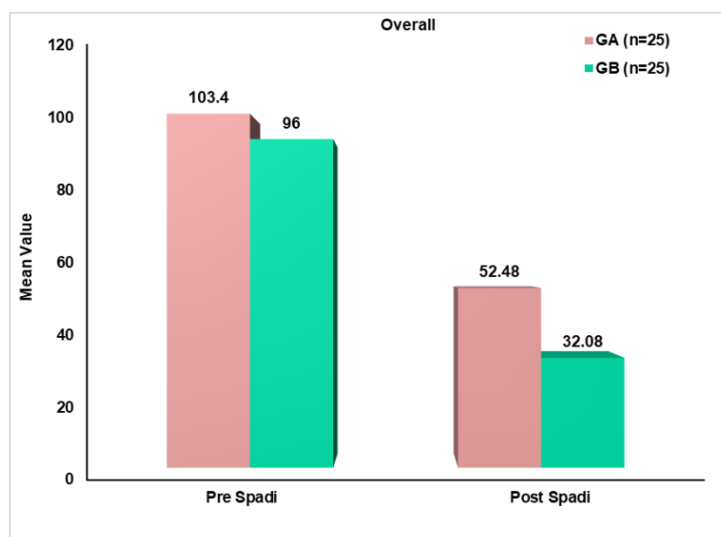


Fig. 1: Comparison of GA Vs GB for pre and post overall

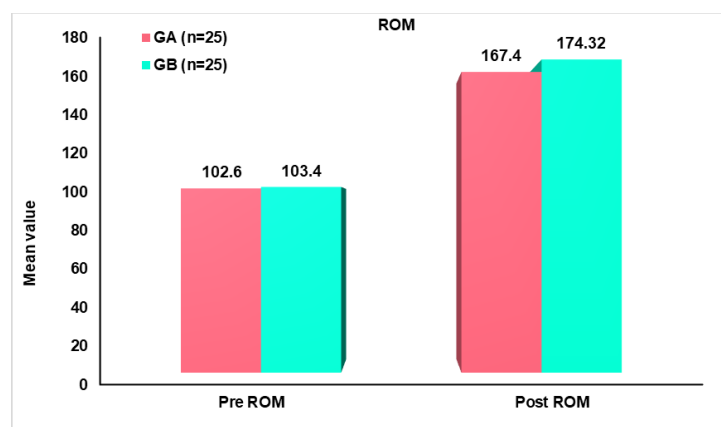


Fig. 2: Comparison of GA Vs GB for pre and post ROM wise

DISCUSSION

There are so many factors that affects some are pathological, traumatic but maximum population experiencing due to soft tissue imbalance where specifically scapular dyskinesia one of the commonest factor in non-traumatic and non-pathological shoulder arm syndrome or painful arc syndrome.

The major reason is scapula plays a major role in stability along with the mobility where shoulder flexion and abduction till mid range scapula act as stabilizer but whenever it goes from mid to end range scapula acts as a mobilizer where we see the scapulo humeral rhythm that decides the head of humerus in the labrum and cavity activity will intact by this rhythmic pattern. so if any factor affected scapulohumeral rhythm which causes more force on that tendinous junction because they act as a vector force; the more force than the normal creating dysrhythmia in the orchestra of movement and as result we see tendon rubbing more on bony structure and getting inflamed causes pain which alter the movement and movement pattern and promoting muscle imbalance.

In this study we divided the participants in two groups; Subjects of group A were treated with the dry needling procedure and exercise programme and group B treated with the kinetic chain activation technique concept and exercise programme. 6 w supervised protocol was followed by measuring the range of motion of shoulder abduction and pain and disability component on shoulder pain and disability index on week 0 and week 6 hence painful arc syndrome patient was evaluated. A written consent was taken from subjects from outpatient setting who fulfilled the inclusion criteria. At the end of 6 w treatment programme with both group A and group B showed improvement in painful arc syndrome. Based on results study supports research hypothesis that there was a significant improvement in ROM and significant reduction in SPADI score associated with painful arc syndrome. Patient participated in group B shows more significant changes.

CONCLUSION

This study investigates the effect of two different interventions on scoring of the outcome tool i. e. ROM and SPADI which denotes the presence of shoulder pathology or disability. The purpose of study was to find out the effectiveness of dry needling and k-cat concept with the exercise programme in the management of painful arc syndrome. Results of the study shows significant difference in the mean of difference of score of group A and group B. The difference for group B was more significant compare to group A. At the end of 6 w training programme both group A and group B Shows improvements in symptoms but the result of study supports that group B (KCAT CONCEPT-finger fanning technique) B is more efficient compare to group A(dry needling).

The result of the study can be applied clinically to assist healthcare worker professionals to manage painful arc syndrome better. Additional study with large number of sample size with more significant inclusion and exclusion criteria are needed the to validate the results.

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AUTHORS CONTRIBUTIONS

All authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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