



International Journal of Physical Education, Sports and Health

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.38
IJPESH 2024; 11(4): 65-67
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<https://www.kheljournal.com>
Received: 06-04-2024
Accepted: 13-05-2024

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Kinetic chain theory and conventional exercise program on pain and functional activities in medial epicondylitis of javelin throwers

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Abstract

The study is to determine the effect of Kinetic chain theory exercise program & conventional exercise on pain and functional activities in javelin thrower with medial epicondylitis.

Introduction: Medial epicondylitis has become more prevalent in adolescent javelin throw players due to the repetitive forces placed on the elbow joint during overhead throwing motions. Dysfunction in wrist, elbow, shoulder or scapula can disrupt the transmission of force, putting greater stress on the remaining links of kinetic chain. Strengthening of the scapulothoracic muscles is proposed as an innovative approach of treating individuals with medial epicondylitis.

Methodology: It is an experimental study with comparative (Pre and Post-test) type. The study was done at Chennai. The study was conducted for 6 weeks. The subjects were selected based on the inclusion criteria: Age group between 18 to 24 years, Javelin throwers, Male subjects only. A total of 30 subjects were recruited for the study and divided into two groups, Group A consist of 15 subjects who were treated with kinetic chain theory exercise program. Group B consist of 15 subjects who were treated using conventional exercise. Outcome measures for the study were visual analogue scale and Quick disability of the arm shoulder hand scale.

Results: On comparing Pre-test and Post-test within and between Group A and Group B on Visual Analogue Scale and Quick Disability of Arm Shoulder Hand Scale score shows highly significant difference in mean values at $P \leq 0.05$.

Keywords: Kinetic chain theory exercise, conventional exercise, javelin throwers, medial epicondylitis

Introduction

Medial epicondylitis is an inflammation of the common flexor tendon in the forearm where it attaches to the medial epicondyle of humerus. The term is commonly used to describe tendinitis of the common flexor tendon as well ^[1]. Medial stress injuries occur to the throwing elbow from repetitive tensile load on the soft tissue of the medial side of the elbow ^[2]. The estimated annual incidence in the medial epicondylitis is 1% versus 3% for the same condition occurring lateral side of the elbow ^[3]. A variety of specific treatment strategies have been described over the years, including electro physical modalities ^[4], corticosteroid injections, exercise therapy and immobilizations ^[5], low level laser therapy etc ^[6]. The scapulothoracic joint is formed by the articulation of the scapula with the thorax ^[7]. It is not a true anatomic joint because it is not a union of bony segments by fibrous cartilaginous or synovial tissues ^[8]. Conservative treatment for medial epicondylitis associated with throwing has positive results ^[9]. Since these players are the ones that coaches desire to have on their team they require special protection in the form of enforced rest periods ^[10]. Two to eight weeks of rest coupled with judicious use of ice massage and non-steroidal anti-inflammatory medication and a super visible rehabilitation program focusing on restoring pain free active elbow and wrist joint mobility, muscle strength and endurance are indicated ^[11]. Corticosteroid injections are avoided as, they may further damage elbow ligamentous and cartilaginous structures ^[12]. After three to six months of treatment, if symptoms have improved and the athlete has regained full range of motion and strength, a mediated throwing program have shown full recovery rates of 40% to 50% in competitive overhead throwing athletes ^[14]. The diagnosis of medial epicondylitis requires a careful patient history and physical examination, and radiographic and

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imaging studies, to distinguish it from other possible etiologies of medial elbow discomfort, such as ulnar collateral ligament instability or ulnar neuritis [15]. The radiographs of affected elbow are generally normal, although 20% to 25% of patient can have soft tissue calcification in proximity to the epicondyle. Throwing athlete may have medial ulnar traction spurs and medial collateral ligament calcification. A Magnetic Resonance Imaging or dynamic ultrasonography may be useful in diagnosis of throwing athletes with confounding medial symptoms by providing more precise evaluation of ulnar collateral ligament. During the first phase care is taken to protect the injured muscle tendon unit from stress but not from function. Often all sport activity must cease temporarily to allow the muscle tendon unit time to heal and to allow formal rehabilitation to progress. Immobilization can atrophy negatively affect the upper extremity kinetic chain. Initially exercise of the distal extremity stresses the injured muscle-tendon unit last: wrist flexion and forearm pronation [21]. Gradual addition of wrist extension and forearm supination, as well as radial and ulnar deviation exercises are added as signs and symptoms allow. Initially, most patients tolerate the exercise better in slight elbow flexion with light weights. Eccentric exercise may have a greater benefit than the concentric portion. The principles of surgical intervention are total excision of the unhealthy pain-producing angiofibroblastic tendinosis tissue, enhancement of vascular access to the surgical site and preservation of normal tissue. Failed surgery is almost always related to inadequate excision of tendinosis tissue with or without excessive release of normal tissue. The kinetic chain theory exercise program proposes that during functional arm motions kinetic energy is transferred from proximal to more distal segments of the arm, providing an effective and efficient mode for distal function. As a result, proximal weakness increases the demand on the distal segment. Without proper proximal scapular strength, there is an increased load on distal tissues at the elbow and wrist. Therefore, based on the observational studies, expert opinion, and the KCT, scapular muscle performance could be an essential piece for rehabilitation professionals to address in patients with medial epicondylitis.

Methodology

The study design was experimental type with comparison of pre and post-test values. The study was done at Chennai with 30 samples convenient sampling. The study duration was 6 weeks with 18 sessions. The inclusion criteria consist of male subjects with age group of 18 to 24 years old who perform javelin throwers only. The subjects shown positive sign for medial epicondylitis test. The excluded part are acute inflammation, infection in the upper limb, elbow fracture and dislocation and hypermobility of the elbow joint. The outcome measures are Visual analogue scale and quick DASH scale. The materials used are 2kg dumbbell and towel.

Procedure

The purpose of the study was explained to the subjects. After obtaining informed consent, demographic information of the standardized history which include age, gender, duration of symptoms and occupation were noted. Group A consist of 15 subjects who were treated with Kinetic chain theory exercise program and Group B consist of 15 subjects who were treated with conventional exercise. Study duration was 6 weeks, 3 sessions per week. The participants were asked to mark their intensity of pain on 10cm visual analogue scale in the data collection sheet with number 0-10 where 0 symbolizes no

pain 10 symbolizes severe pain. The outcome measure was recorded using measuring tools VAS (Visual Analogue Scale) and Quick DASH (Disability of the Arm, Shoulder, Hand) before and after treatment as pre and post test score. Pre-test measurement was recorded using VAS for the pain subjectively before the initiation of 1st session of treatment protocol and the post-test values were recorded at the end of 18th session for both groups respectively. Quick Disability of the Arm, Shoulder, Hand scale was measured before the initiation of 1st session of treatment protocol and the post-test values were recorded at the end of the 18th session for both the groups respectively.

Results

On comparing the Mean Values of Group A & Group B on VAS Score, it shows a significant decrease in the post test mean values in both groups, but (Group A - Kinetic Chain Theory Exercise Program) shows $2.26 \pm .798$ which has the lower mean value is more effective than (Group B - Conventional Exercises) 3.46 ± 1.06 at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing the Mean Values of Group A & Group B on Quick DASH Score, it shows a significant decrease in the post test mean values in both groups, but (Group A - Kinetic Chain Theory Exercise Program) shows 27.60 ± 3.24 which has the lower mean value is more effective than (Group B - Conventional Exercises) 44.33 ± 5.99 at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing Pre- test and Post- test within Group A & Group B on VAS & Quick DASH Score shows significant difference in the mean values at $P \leq 0.05$.

Discussion

The present study was aim to evaluate the effectiveness of Kinetic chain theory exercise program versus Conventional exercise for Javelin throw players with medial epicondylitis, also to find out which group is better in reducing pain and improve the functional disability of the patients. From the result of the study, it is hypothesized that scapular stabilization exercise showed significant and gave better outcome to reduce pain and improve functional ability than conventional exercise in patient with medial epicondylitis. Although epicondylitis is one of most prevalent disorder of the arm, it is estimated that medical epicondylitis makes up approximately 20% of all cases of epicondylitis. Medial epicondylitis is one of the most common elbow problems, predominantly in javelin throw. Commonly used synonymous terms include medial elbow pain, medial epicondylitis, golfers elbow. To measure the functional abilities Quick Disability of the arm, shoulder, hand scale was chosen as an outcome measure. The characteristics of medial epicondylitis is the pain present during throwing movement over the elbow region. VAS is used to observe the subjective pain therefore, it was taken as an outcome measure. To assess the intensity of pain, VAS was almost used by all the article include in the study. The statistically significant changes in pain intensity can be consider clinically relevant. The Kinetic chain theory exercise program increases the ability to generate force. It was seen that there was a significant reduction in pain intensity ($P \leq 0.05$). Quick Disability of the arm, shoulder, hand scale demonstrated significant improvement statistically in Group A ($P \leq 0.05$). Kinetic chain theory exercise program improves the reducing pain and improve the functional disability. After giving Kinetic chain theory exercise the subjects had pain relief and improved the functional disability. Kinetic chain theory exercise program exercise is more effective than

conventional exercise. Jon Goldfarb, *et al* (2021) study the effectiveness of Kinetic chain theory exercise program on patient with medial epicondylitis. Kinetic chain theory exercise program were effective treatment for medial epicondylitis patients. In the study, a Kinetic chain theory exercise program was performed for patients with medial epicondylitis ^[29]. Ellenbeker TS, Nirschl R, *et al* (2013) studied the effects of Scapular strengthening training on pain and functional performance in women with medial epicondylitis. Kinetic chain theory exercise plus routine physiotherapy exercise was more effective than routine physiotherapy exercise alone for improving pain and functional performance in individuals with medical epicondylitis ^[30]. Hoogvliet P, Ransdrop MS, *et al* (2013) studied the effects of conventional exercise on pain and functional performance in patient with medial epicondylitis. Conventional exercise can reduce the pain in people with medial epicondylitis but decreases the relative activity of biceps brachii. Such a decrease in relative activity of biceps brachii after conventional exercise implies that it may not be suitable facilitative exercise training ^[31]. On comparing Pre-test and Post-test within Group A & Group B on VAS & Quick DASH Score shows significant difference in the mean values at $P \leq 0.05$.

Conclusion

The study concluded that there was a significant effect on Kinetic chain theory exercise program in reduction of pain and functional improvement in Javelin throwers. However, superiority of Kinetic chain theory exercise program was found to be effective over conventional exercise in terms of pain and functional activities in elbow joint among Javelin throwers with medial epicondylitis.

Acknowledgements

We thankful to all participants, university officials for giving opportunity to complete the research on time.

Conflict of interest

Nil

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