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A Comparative Study Of OKC And CKC Exercise Versus CKC With Hip Strengthening Exercise In Idiopathic Anterior Knee Pain

Deepak Sharma[1], Dr. Ashish Chauhan (PT)[2], Dr. Vidhi Singh(PT)[3], Kapil Kapoor[4]

[1] MPT (Ortho) Student, Sanskriti University, Chhata, Mathura, UP, India.

[2] Assistant Professor, Department of Physiotherapy, School of medical and allied sciences, Sanskriti University, Mathura, UP, India.

[3] Assistant Professor, Department of Physiotherapy, School of medical and allied sciences, Sanskriti University, Mathura, UP, India.

[4] MPT (Sports) Student, Sanskriti University, Chhata, Mathura, UP, India.

ABSTRACT

Introduction: Idiopathic anterior knee pain (IAKP) is one of the most common conditions to bring active young patients to a sports injury clinic; it is reported in about 40% of adolescent athletes. Idiopathic anterior knee pain (IAKP) is a common musculoskeletal disorder typically occurring in physically active people aged 40 years and younger.

Methodology: It is an experimental study of pre-test and post-test. The sampling method is Purposive random sampling and sample size is 20. The duration of study is 4 weeks. The inclusion criteria and exclusion criteria are considered during their selection. Subjects were randomly divided into 2 parts - 'A'&'B'. Group 'A' will receive open kinetic chain and closed kinetic chain exercises. Group 'B' will receive close kinetic chain exercises with hip strengthening exercises. Outcome measure was NPRS and VAS scale.

Results: The mean difference and standard deviation for pain score between preand post treatment for Group B are recorded. Analysis of the data showed that there is reduction in pain score and improvement in functional ability. The comparison of significance of reduction in the pain score and functional ability score between pre and post treatment programs for Group A and pre and post treatment programs for Group B was done with paired 't'test values.

Conclusion: This study concluded that the group A showed better improvement than the group B in reduction of pain and gaining improvement in functional ability.

Key words: Idiopathic anterior knee pain, OKC, CKC, chondromalacia patella and patellofemoral tendon

INTRODUCTION

Idiopathic anterior knee pain (IAKP) is one of the most common conditions to bring active young patients to a sports injury clinic; it is reported in about 40% of adolescent athletes [1]. Idiopathic anterior knee pain (IAKP) is a common musculoskeletal disorder (Chad Cook, et al, 2010) typically occurring in physically active people aged 40 years and younger (Chad Cook, et al, 2010). Prevalence ranges for IAKP are reported to be from 15% to 33% in adults, and 21% to 45% in active adolescents. This syndrome is considered the most common overuse injury of the lower limb in active individuals, accounting for 11% to 17% of all knee pain presentations in general practice. Common symptoms include diffuse peripatellar or localised retropatellar pain during activities such as running, moving up or down stairs, squatting, and sitting with knees bent for prolonged periods. The clinical presentation (Chad Cook, et al, 2010) of IAKP often includes muscular weakness and altered lower limb biomechanics. Traditional treatment methods aim to improve patellar alignment and strengthen muscles surrounding and acting on the knee joint. Patients with Idiopathic anterior knee pain have to be examined carefully with regard to functional causes for Idiopathic anterior knee pain.

Multiple studies have been conducted in specific population groups to quantify the incidence of IAKP. Female military tactical athletes showed an incidence rate of 16.7 per 1000 person-years compared with enlisted males' incidence rate of 12.7 per 1000 person-years across all IAKP diagnoses [2]. A recent study by Hannington et al. found that college basketball athletes in university and college basketball facilities presented a 60% incidence of IAKP due to all causes [3]. Dey et al. reported the annual prevalence of patellofemoral pain (PFP) in the general population as 22.7% [4]. A recent systematic review by Smith et al. reported that females experience twice the risk of development of IAKP due to patellofemoral causes than males [5]. The management of IAKP has evolved over recent years. The condition was previously thought to be a self-limiting condition in most cases; the recent literature indicates the propensity of IAKP toward repeated chronicity [6]. The management of IAKP is aimed toward rehabilitation in most cases; however, recovery from patellofemoral IAKP can be protracted, even despite patient adherence to the treatment and rehabilitation protocols [7].

The non-resolution of IAKP results in varying levels of disability, which may preclude the patients' participation in physical activity, sports, and work. The condition may even recur and persist for multiple years [8].

The degree of difference in diagnosis of IAKP includes chondromalacia patella and patellofemoral tendon disease. The pathophysiology is thought to be different, so there are alternative treatments. Patients complain of similar symptoms, but neither is a generic term for IAKP (Blazer K., 2003).

Pain mostly occurs when load is put on the knee extensor mechanism when climbing stairs, squatting, running, cycling or sitting with flexed knees. Patellofemoral pain is caused by numerous pathophysiological processes. Etiology of Idiopathic anterior knee pain is that patellofemoral mal-alignment and mal-tracking (Pathomechanics) mechanisms are overload, patellar mal-tracking/mal-alignment and imbalances in muscle strength and contraction.

MRI suggests that increased femoral internal rotation results in increased lateral patellar displacement and resultant increased stress in the patellofemoral joint.

Open kinetic chain exercises are defined as a combination of successively arranged joints in which the terminal segments can move freely. This form of exercise allows you to train different muscles of one body individually. Close kinetic chain exercises are defined as when resistance is placed through the distal aspect of the extremity and remains fixed to the extremity.

It states that motion in which the joints of the limbs work with the contribution of all points. All functional movements in human beings are closed-chain movements, such as walking and eating.

Open Kinetic chain exercises isolate the hip muscle contraction. Isolated open Kinetic chain hip abductors and lateral rotators exercises were added. Closed Kinetic chain exercises produce a contraction in the hamstrings and quadriceps muscles.

Decreased hip muscle strength has been implicated as a contributing factor in Idiopathic anterior knee pain. Those with Idiopathic anterior knee pain demonstrated decreased strength in hip abduction, knee flexion, knee extension and external rotation. Isometric strength will be measured for hip abduction, hip external rotation and knee extension.

The functional problems associated with IAKP in young adults are increasing, particularly with the rise in physical activity to counteract sedentary lifestyles and to promote health and wellbeing. The knee joint is one of the hardest parts of the body to work. As a result, it is easy to harm other chronic conditions that cause knee pain. This is to be memories that one of the most successful long-term options is physical therapy.

Patients were evaluated pre- and post-treatment for their pain severity using NPRS scale. NPRS is a segmented numeric version of VAS.

The Numeric Pain Rating Scale (NPRS) is a segmented numeric version of the visual analog scale (VAS) in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of the individual's pain (Rodriguez, 2001).

According to McCaffery et al. (1989) and later on Stevens, Lin, and Maher, (2016) the Numeric Pain Rating Scale (NPRS -11) is an 11-point scale for the patient self-reporting of pain. It is for adults and children 10 years old or older.

Patients were assessed for pre- and post-treatment pain severity using the NPRS scale. Measuring Results- Primary variables were self-reported using NPRS. The quadratic variable was strength.

The intensity of pain can be measured by Visual analog scale. It is a 10 cm lines marked with numbers from 0 to 10. Where, 0 means no pain and 10 means maximum pain. Subjects were asked to mark their pain on this line, depending on their severity. The clinical application of the Visual Analog Scale (VAS) provides a simple method for measuring subjective experience and has been shown to be effective and reliable in a variety of clinical and research applications. VAS is very commonly used scale for pain.

The Kujala score is composed of 13 multiple choice questions: the presence of a limp, the need for support, the ability to walk, the ability to climb stairs, the ability to squat, the ability to run, the ability to jump, prolonged sitting with knees in flexed position, the presence of knee pain, the presence of knee swelling,

the presence of abnormal painful patellar movement, atrophy of thigh muscles, the deficiency of knee flexion. Total scores range from 0-100.

The aim of study is to compare the effects of open kinetic chain and close kinetic chain exercise versus close kinetic chain with hip strengthening in Idiopathic anterior knee pain.

METHODOLOGY:

It is an experimental study of pre-test and post-test. The sampling method is Purposive random sampling and sample size is 20. The duration of study is 4 weeks. The inclusion criteria of study are unilateral Patellofemoral pain or Idiopathic anterior knee pain, Age group 35-60 years and at least three months' history of pri-patellar. The exclusion criteria are recent fracture, articular capsule or meniscus injury, ligament rupture, Osteoarthritis, Limb length discrepancy. And Deformity. Subjects referred by an orthopedic department were assessed according to the selection criteria. Then the consent form was obtained by subjects. Outcome measure was NPRS scale. Subjects were randomly divided into 2 parts - 'A'&'B'.

Group 'A' will receive open kinetic chain and closed kinetic chain exercises.

Group 'B' will receive close kinetic chain exercises with hip strengthening exercises.

Outcome measures will be assessed by Visual Analog Scale, Kujala Knee Scoring Scale and Numeric Pain Rating Scale. It is also assess at baseline before treatment on day 1 and end of intervention on 4th week.

PROCEDURE- Prior to the beginning of "open kinetic chain and close kinetic chain exercise" program, a 10 repetition maximum will be determined. After that subject will be inculcated to train at 60% of 10 R.M. A new 10 R.M will be recognized at the end of a weekend of training. Both open kinetic chain and close kinetic chain program will be repeated for 3 sets of 10 repetitions. Subject will rest 1 min after termination of every one set.

In open kinetic chain exercise protocol, each exercise will be held isometrically for a count of 6 second with 3 second rest between repetitions. Each exercise in closed kinetic chain protocol will be executed enthusiastically with 3 second rest between repetitions.

Therapeutic open kinetic chain exercise program-

- Static quadriceps contraction at maximum strength with knee fully extended.
- Straight leg rise with subject in supine.
- From 10 degrees of knee flexion to maximal extension in a short arc.
- Leg adduction exercises in lateral decubitus position.

Therapeutic closed kinetic chain exercise program-

- Seated leg press.
- Double or single 1/3 knee bend.
- Stationary biking.
- Tread up and downstairs exercise.
- Mini trampoline for progressive jumping exercise

After the open kinetic chain and closed kinetic chain exercise regimen, the subject will be taught to complete traditional static quadriceps, hamstrings, and gastrocnemius stretching exercises. All participants will be advised to do three repetitions of a 30-second static stretch of this muscle group.

After completing the data collection procedure, facts will be investigated to conclude result using certain statistical tests.

RESULTS:

TABLE 4.1: MEAN DIFFERENCE VALUE OF GROUP A GROUP B. (VASSCALE & KUJALA IDIOPATHIC ANTERIOR KNEE PAIN SCALE)

GROUPS	MEAN DIFFERENCE	
	VAS	KUJALA
EXPERIMENTAL GROUP A	4.63	38.3
GROUP B	2.89	25.6

TABLE4. 2: STANDARD DEVIATION VALUES OF GROUP A AND GROUP B .(VAS SCALE & KUJALA IDIOPATHIC ANTERIOR KNEE PAIN SCALE)

GROUPS	STANDARD DEVIATION	
	VAS	KUJALA
GROUP A	1.06	5.64
GROUP B	0.690	5.16

TABLE4. 3: PAIRED 't' TEST VALUE OF GROUP A AND GROUP B. (VAS SCALE & KUJALA IDIOPATHIC ANTERIOR KNEE PAIN SCALE)

GROUPS	CALCULATED PAIRED 't' VALUES		TABLE VALUE	SIGNIFICANCE
	VAS	KUJALA		
GROUP A	16.13	28	2.15	SIGNIFICANT
GROUP B	15.694	17.18	2.15	SIGNIFICANT

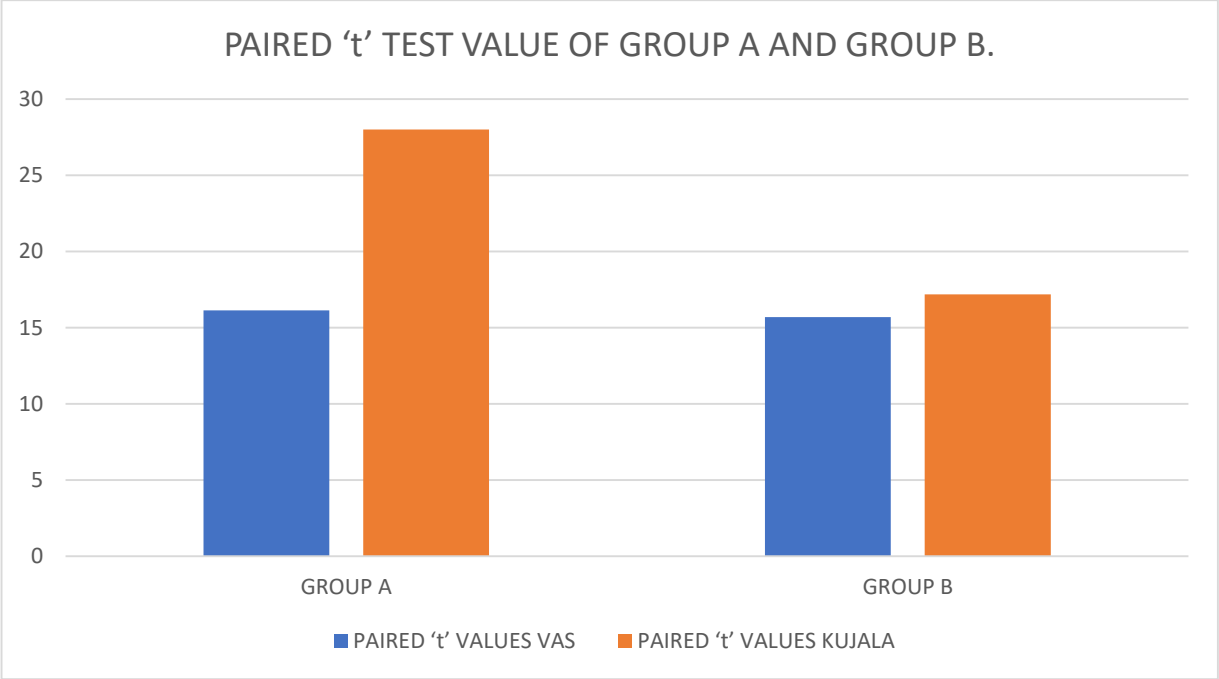

Figure 1: PAIRED 't' TEST VALUE OF GROUP A AND GROUP B

TABLE 4.4: **UNPAIRED 't' TEST VALUE OF GROUP A AND GROUP B. (VAS SCALE & KUJALA IDIOPATHIC ANTERIOR KNEE PAIN SCALE)**

GROUPS		CALCULATED UNPAIRED 't' VALUES	TABLE VALUE	ICANCE
COMPARISONOF GROUP A AND GROUP B	VAS	5	2.05	SIGNIFICANT
	KUJALA	6.64	2.05	SIGNIFICANT

The mean difference and standard deviation for pain score and functionalability score between pre and post treatment for Group A are recorded.

Analysis of the data showed that there is significant reduction in pain score(VAS) and improvement functional ability score(KUJALA Scale) pre and post treatment programs.

The mean difference and standard deviation for pain score between preand post treatment for Group B are recorded . Analysis of the data showedthat there is reduction in pain score and improvement in functional ability.

The comparison of significance of reduction in the pain score and functional ability score between pre and post treatment programs for Group A and pre and post treatment programs for Group B was done with paired‘t’test values.

Unpaired t-test for the pain scores and disability between posttest valuesof Group A and Group B indicating there is high significance of pain reduction in Group A than Group B, and for the disability scores between posttest values of Group A and Group B for the disability scores indicatingthat high significance of disability reduction in Group A than Group B.

There is statistically significant reduction in pain and improvement in functional ability between pre and post treatment programs in Group A whencompared with Group B. In "Idiopathic anterior knee pain" limitation of movement is due to tenderness and strength guarding rather than stiffness, once the pain is relieved the patient will be capable to execute normal functional activity.

Tenderness was initiates to decrease effectively in "group A" as compared to "group B".

This ‘t’ value higher than the one tail table value. Hence, we are capable for reject the 'null hypothesis' as well as accept the alternative hypothesis. Therefore, treatment given in group A reduces pain effectively than treatment given in group B.

CONCLUSION:

This study concluded that the group A was better improvement than the group B in reduction of pain and gaining improvement in functional ability.

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