

Effectiveness of Post-Isometric Relaxation Technique Versus Rhythmic Stabilization in Postoperative Anterior Cruciate Ligament Reconstruction

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Abstract

Background; Anterior cruciate ligament injuries are very common in young athletes who play sports that require turning, decelerating, and Jumping. Through the use of physical therapy exercises and other approaches, physiotherapy is beneficial for treating ACL-deficientness and enhances the quality of life. The medial wall of the lateral femoral condyle is where the anterior cruciate ligament (ACL) begins, and its insertion site in the Centre of the intercondylar area of the tibia is where the ACL ends. Since it prevents the tibia from translating forward and rotating, it plays a key role in the knee joint. **Method;** The study was a comparative study conducted among both male and female participants held at the Krishna college of physiotherapy. a location where measurements were taken and information was gathered from the individuals. There was a completely random selection of individuals. Samples will be chosen using certain inclusion and exclusion criteria. Participant permission will be obtained properly. The participants will be briefed on the study's methodology and goals before any data collection begins. Two groups will be created from the participants. one group will receive post-isometric relaxation and other group will receive rhythmic stabilization. The primary outcome measure used was Range of knee joint the Range of motion of the knee joint will be measured by goniometer and Manual muscle testing it help to determine the extent and degree of muscular weakness and also help to-asses the improvement of protocol **Result;** In this study after analyzing the data it was found that post isometric relaxation of muscle energy technique is more effective than rhythmic stabilization of proprioceptive neuromuscular facilitation. **Conclusion;** based on the previous studies both of these stretching Technique is effective for anterior cruciate ligament reconstruction but from this post isometric relaxation is much more than the other one.

1. Introduction

Sprains and tears of the anterior cruciate ligament (ACL) are the most common kind of knee injury. High school and college athletes that participate in contact sports such as football, basketball, and soccer are at a greater risk of tearing an ACL. The cruciate ligaments form an X shape, with the ACL in front and the PCL at the rear. The cruciate ligaments control the knee's angular translation and rotation. The ACL is a diagonal band of tissue that runs across the middle of your knee. It prevents the tibia from sliding in front of the femur, which provides rotational stability to the knee. The posterior cruciate ligament stops the tibia from

moving backwards. It's more robust than the ACL and suffers considerably fewer injuries.

The anterior cruciate ligament (ACL) may be torn by a variety of actions, including an abrupt change in direction, a halt, a slowing of speed while jogging, a landing from a jump that is not executed properly, or a direct impact or collision, like a tackle in football. Research shows that female athletes have a higher risk of ACL damage across the board than male athletes do. This is thought to be caused by physical fitness, muscular power, and neuromuscular control variations. Other potential explanations include altered ligament qualities brought on by estrogen and changes in the position

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of the pelvis and lower extremities. A popping sound and a slipping sensation in the knee if an anterior cruciate ligament is torn, Lack of mobility, pain when walking, and tenderness along the joint line are all symptoms.

Depending on the patient's specific requirements, the ACL tear treatment will differ. For instance, young athlete who competes in agility sports will probably need surgery before they can resume their sports activities safely. An older person who has a less active lifestyle might be able to resume a more sedate way of life without surgery. It's crucial for people to recover their range of motion after surgery. To increase the range of motion, a variety of procedures can be used, but there hasn't been much research comparing various approaches. The aim of this study is to assess the effectiveness of the post-isometric relaxation technique versus rhythmic stabilization in postoperative anterior cruciate ligament reconstruction in people who have undergone ACL repair. The muscular energy method is a kind of osteopathic manipulation in which the patient performs light isometric contractions on their own muscles to induce a state of relaxation and lengthening known as autogenic or reciprocal inhibition. Post-Isometric Relaxation (PIR) occurs when muscle tone decreases in one or more muscles after being contracted for a short time at less than maximum isometric force[2]. In PIR, autogenic inhibition is put to use. Stretching and contracting the muscles are only two parts of the proprioceptive neuromuscular facilitation (PNF) programme. Therapeutic exercise using the method of neuromuscular stimulation and movement patterns based on functional diagonals to elicit a motor response and enhance neuromuscular control and function. Rhythmic stabilisation entails alternating isometric contractions against resistance without the intention of movement. Strength and stability are both boosted, and both active and passive range of motion are increased. The agonistic muscle group contracts isometrically as the therapist applies resistance. Rather of attempting to change position, the patient keeps the affected body part in place. Around 200,000 ACL tears occur annually, with 100,000 requiring surgical treatment. Non-contact processes account for the bulk of ACL incidents,

with direct contact processes responsible for the remaining 30% of incidents.

2. Materials and methodology

After receiving approval to conduct the research from the Krishna institute of medical sciences, Deemed to Be University, Karad's institutional ethics committee, data collecting began. Both male and female volunteers were evaluated and data were collected at the Krishna college of physiotherapy for the purpose of drawing comparisons between the sexes. The sample of people who took part was chosen at random. The angle, hip, and knee joints of each person were examined for signs of damage or discomfort. Only participants between the ages of 18 and 40 who have been diagnosed with an ACL injury and have had ACL reconstruction surgery will be included in the research. Individuals with any other fracture or surgery other than ACL at the knee joint and the subject with ACL injury that occurred more than six months before participation in the study did not fit into the eligible for the study.

Success was measured primarily by the patient's ability to fully extend their knee. The range of motion of the patient's knee will be determined using a goniometer. A supine position with the patient's legs stretched apart is ideal. The greater trochanter and femoral midline are in line with the lateral epicondyle as the fulcrum, while the lateral malleolus and tibial midline are in line with the tibial fulcrum. A normal range of motion for a healthy knee is 135 degrees of flexion. And since the patient may lay prone with their legs supported in a neutral posture, this table is great for a knee extension. Placement of the goniometer for measuring knee extension is identical to that for measuring knee flexion. The normal range of knee extension is 0 to 10 degrees. Manual muscle testing is also used as the outcome measure it helps to determine the extent and degree of muscular weakness and also helps to assess the improvement of the protocol. Manual muscle testing should be done every day before and after the protocol, it will help to determine the effectiveness of the treatment depending on whether we can increase or decrease the resistance. Numerical pain rating scale (NPRS) this outcome measure will help to assess the pain for this we need only patient response and no need

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for any physical activity. There is just one dimension to the numerical pain rating scale used to assess an individual's level of pain. '0' represents the absence of pain ("no pain"), while '10' represents the worst possible discomfort.

The permission will be taken from the authority in the area where the study will be conducted. The sample will be chosen using inclusion and exclusion criteria, and informed permission will be obtained from each participant. Participants will be briefed on the study's methodology and goals. Both muscle energy method and proprioceptive neuromuscular facilitation will be administered to half of the subjects. The rehabilitation program for both groups included a local massage section (8-10 min) followed by an individual standardized physiotherapy program (45-50 min). The subject of the research lot receives an extra 10-15 min of session for the specific research procedure. The rhythmic stabilization of PNF consisted of alternating isometric contractions against a resistance for 10 seconds, with no motion intended (2-3 days/week,15 rep,3 sets session with a 30-sec rest interval between sets and 60 sec were provided after completion of 15 repetitions for each pattern and between sets)The post isometric relaxation of

3. Result

Age distribution

Age group	mean	Standard deviation	Unpaired t test	P value
18-29 years (51%)	97.98	3.2	1.423	0.1583
30-40 years (49%)	96.82	3.6	1.423	0.1583

Interpretation- According to the data in the table above, there was no statistically significant correlation between players' ages and levels of discomfort.

MET as same like rhythmic stabilization alternating contraction against resistance but in this technique movement of the knee joint is initiated after each set of the session coming to the new gained range from that new range isometric contraction against resistance with movement(2-3 days/week,15 rep,3 sets session with a 30-sec rest interval between sets and 60 sec were provided after completion of 15 repetitions for each pattern and between sets)

Statistical analysis

For sample size following formula was used

$$n=4pq/l^2$$

The information was analysed statistically with the help of the application InStat. All values were added together and then divided by the total number of values to get the average, and the standard deviation was calculated in the same manner for each outcome measure. Microsoft Excel was used to generate many charts showing the calculated frequencies and percentages. This is a very significant result since the P value is less than 0.0001.

Comparison between muscle energy technique and proprioceptive neuromuscular facilitation with range of motion of the knee joint

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Duration	Muscle energy technique	Proprioceptive neuromuscular facilitation
	Mean ± SD	Mean ± SD
1-2 week	0.20 ± 0.761	0.07 ± 0.254
3-4 week	0.30 ± 0.915	0.17 ± 0.407
5-6 week	0.40 ± 1.040	0.27 ± 0.450

As a result of this table muscle energy technique is more effective than proprioceptive neuromuscular facilitation because the total treatment protocol for 6 weeks the range of motion is measured in between 2 weeks so the result of that shows that significant increase in range of motion in the group with muscle energy technique. But according to the numerical pain rating scale the pain is same in both groups.

4. Discussion

This study was a simple random comparative study design. A total of 32 participants was involved in this study divided into two groups of 16. Group A is muscle energy technique (post-isometric relaxation) and Group B is proprioceptive neuromuscular facilitation (rhythmic stabilization). Each day of therapy consisted of a single session. The two groups started out with the same measurement from day one, serving as a kind of pretest. Few previous investigations have examined the efficacy of two distinct types of stretching, namely, muscle energy technique and proprioceptive neuromuscular facilitation for anterior cruciate ligament reconstruction. Both of these techniques are proof that it helps in ACL reconstruction but the main aim of this study was from these two techniques which one is more effective. The main materials needed for this study are a goniometer and a low couch of convenient height. Several approaches are utilised at various times on the same group of people in order to restore full function and performance to damaged soft tissues and lessen the limitations that limit their full range of motion. Power, strength, and mobility may all benefit from this method. The total time for the session is more than one hour first we go with local massage for nearly ten minutes

after that standardized physiotherapy programs like theraband exercise, stretching, and isometrics for knee flexors and extensors, before this all programs hot moist pack can also give it help to reduce the pain and improve the quality of the treatment, normal free exercises for hip and knee can also give. During the first week of the treatment both the group showed an improvement of increase in 3 degrees to 5 degrees after that continue with the same protocol at that time the muscle energy group has an increase of 2 degrees but for group B it remained the same at the end of the procedure their good difference between group A and the group B nearly 2 degrees to 5-degree difference in the participants. As a result of this study I can assure that post-isometric relaxation of muscle energy is much more effective than rhythmic stabilization of proprioceptive neuromuscular facilitation. There is no significant between age because both groups have same number of people and they are with nearly same age.

5. Conclusion

Data analysis from this research shows that the post isometric relaxation of muscle energy approach is superior to the rhythmic stabilisation technique for facilitating proprioception in the muscles.

When other variables, such as age, are considered in conjunction with pain, and gender was observed then there is no significance.

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