**Multidisciplinary Physiotherapy Approach to Improve Functional Activity after ACL Reconstruction.**

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**Abstract**

**Background:**Anterior cruciate ligament (ACL) reconstruction surgery is a procedure to replace a torn anterior cruciate ligament. ACL injuries are most common in sports activities due to sudden stops and changes. There are many protocols for the ACL rehabilitation after ACL reconstruction, among them this study is to compare the general ACL protocol with multidisciplinary physiotherapy

**Aim:** The main aim of the study is to compare the effect of multidisciplinary physiotherapy approach and general ACL protocol to improve functional activity from pain after ACL reconstruction.

**Methods**: The experimental study was conducting on 30 post operative patients of acl reconstruction using convenient sampling technique. Based on the inclusion and exclusion criteria subjects are divided into two groups group A And group B. group A is treated with acl reconstruction protocol and group-B is treated with multidisciplinary physiotherapy approach.

**Results:** This is a significant improvement in VAS score and triple hop test in group B than the group A.

**Conclusion:** This study shows that there was significant improvement in reducing pain and improving functional activity in both the groups. But the multidisiciplinary physiotherapy (group B) showed more significant improvement than the general protocol (group A) in improving the functional activity.

**Key Words**: ACL reconstruction, polymetric exercise, nueromuscularactivities, functional activity and ACL protocol.

**Introduction:**

Anterior Cruciate Ligament (ACL) reconstruction surgery is a procedure to replace a torn anterior cruciate ligament. ACL injuries are most common in sport activities due to sudden stops and changes Re- construction surgery is the replacement of the torn ACL ligament. The ACL is the strongest ligament of the knee and helps in the stability of the knee. The ACL surgery is of two types which has open surgery and the arthroplasty.(1,2.)The grafts which are used in it are harm strains and pattelar tendon grafts commonly(8). They will create a tunnel in the tibia and the tunnel in the femur and a graft which has been prepared was sent through these tunnels in order to create a new ACL(3,), In the final phase of the graft passage the blog plugs are pushed into the femur and into the tibia and the graft is in tension and fixed into the place on both the femur and tibia with a fixation device of choice and the graft allows the recreation of the normal path of the native ACL(5). They might use the metal screw to hold the graft I its correct anatomic position which will allow to heal the surrounding bone. (9,10)Physiotherapy can be given as early as possible(6). After the rehabilitation(11,12) patient can get back to the sport he love but it needs lots of hard work, right therapy and right mindset ACL is most devastating and frequent injury in 50% of knee injuries(7). knee is the second most commonly injured joint after ankle sprain.

Approximately 50% of acl injuries occur in combination with damage to the meniscus articular cartilage or other ligaments. Additionally patient may prone to bone injuries of the bone beneath the cartilage surface. In India the most common sports are kabaddi and football according to the studies the kabaddi players had undergone through more damage (220/291) than the football players (144/291). (2)According to the study 83.9% of the patient were male 60.5,23.0,1.46 and 8.11% were Chinese, Malaysia, Indian and other origin respectively.69.6 and28.7% where in white collared and blue collared jobs, respectively. while 1.69% were unemployed. Mean age at operation was 29.4yrs. Mean body mass index was 25.3kg/m2.82.4 and 17.6% of acl tear are sports (contact - 27.5%, and no contact 72.5%) and no sports injuries (activities of daily living 94.2%, road traffic accidents 55.77%)respectively(4). The top four sporting activities causing acl tear were Soccer, Basketball Racquet games and Volleyball56.2% of acl tears presented with concomitant knee injuries (medial meniscus- 63.4%, lateral meniscus-31.1%, Posterior cruciate ligament-5.49%) 84.5% are primary tears. In USA the incidence is 100.00 to 200.00 per year and the ruptures are estimated to range from 30 to 78per 100000 person. In India most common injury and was noted in 86.5% of knee I jury (n=814complete, tear =28 and partial acl tear=27). In Australia (54%n=81), Jamaica (1%n=22), Malaysia (3%n=4), New Zealand (11%n=16) Singapore (2%n=3)South Africa(10%n=15) United Kingdom(19%n=29).The sports related acl tears (83.4%) (244/296)confidence interval(ci=79.2-87.6%) where more prevelant than non sports related acl tears (17.6%(52/296),95% ci =13.3-21.9%) the prevalance of acl tear that took place in a sport setting was similar at 87.1% of males and 87.5% for females.ACL injuries was the most common injury and was noted in 86.5% of knee injuries (N =314; complete ACL tear 287 and partial ACL tear 27). meniscal injury ( both medial and lateral) was noted in 284 knees and was the second most common knee injury seen in 78.24% of the knee injuries).The common spots include soccer, basketball, taekwondo, snow sports, rugby, badminton, hockey, volleyball, miscellaneous. It is important to understand the ACL anatomy and biomechanics it impact treatment decisions.(18,21).The treatment options for ACL include both surgical and non- surgical. The surgical treatment is usually advised in dealing with combined injuries. The non-surgical treatment are sometimes helpful in isolated with ACL tears. In the surgical treatment the ACL tear(13,14) were not usually repaired using suture to sew it back together because repaired ACL(30,31,32) have generally been seen to fail over time. therefore ACL is generally replaced by the graft made of tendon.The grafts include patellar tendon graft Hamstring tendon Graft Quadriceps tenon graft Allograft patellar tendon, achilles tendon, Semitendinosus, Gracilis or posterior tibialis tendon. Patients treated with surgical reconstruction of acl injury has long term success rates over 95%. Recurrent instability and graft failure are seen in approximately 1-2%of patients. The goal of the rehabilitation(15,16,17) is to prevent instability and to restore the function of the torn ligament creating a stab knee this allows the patient to return to the sport. The main aim of the study is to compare the effect of multidisciplinary physiotherapy approach and general ACL protocol to improve functional activity from pain after ACL reconstruction.This study is undertaken with an intention to compare the effect of multidisciplinary physiotherapy approach and ACL protocol to improve the functional activity and to to reduce pain.

**Methods:**

The experimental study was conducting on 30 post operative patients of ACL reconstruction using convenient sampling technique. Based on the inclusion and exclusion criteria subjects are divided into two groups that is group A and group B. The subjects with postoperative ACL surgery patients between age 18 to 40 years which include both males and females were included in the study. The subjects worth presence of major musculoskeletal conditions, cardiovascular or neurological conditions and pulmonary conditions limiting in cognition and mobility were excluded. After receiving an informed consent from patient detailed personal history is taken and history of antro-pometric parameters such as height and weight are measured and using these parameters body index calculated. General physical and systemic clinical examination is done to rule out any pathology all the examinations were done by taking all safety measures and the patient is informed regarding the concern form and the prior information is given to the subject regarding the procedure and measures of vas and triple hop test.

Group: A

The reading of vas and triple hop test was taken prior to the treatment. The subjects of group A was treated with general ACL reconstruction protocol with Quadriceps setting, Patellar mobilizations, Ankle pumps, Prone hang/heel prop, Heel slides with band, SLR, Standing hamstring curl, Prone eccentric hamstrings, Hamstring catches, Standing toe-raises,Hip Abduction, 1/3 knee bends, Wall slides, Bridging for a period of 6 months tests are performed.

Group B:

The reading of vas and Triple hop test was taken prior to the treatment, Group B subjects are treated with ACL injury protocol and multidisciplinary physiotherapy approach which contains proprioceptive neuromuscular facilitation and Poly-metric activities. Both the groups are treated with 5days per week for a period of 6months.

**Results:**

The data was statistically analyzed using descriptive and inferential statistics; mean and standard deviation was estimated using paired and independent t test. Paired t test was used to compare data sets within the groups and independent t test was used to compare the data sets between the groups.

**Table:1 Comparison of pre-test and post-test values of Triple Hop Test and VAS in group A**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **GROUP A** | | **MEAN** | **STANDARD DEVIATION** | **t VALUE** | **P VALUE** |
| Triple Hop Test (THT) | PRE TEST | 19.53 | 1.02 | 15.2895 | <0.0001 |
| POST TEST | 22.20 | 0.98 |
| VAS SCORE (VAS) | PRE TEST | 7.98 | 1.25 | 18.5699 | <0.0001 |
| POST TEST | 2.98 | 0.26 |

The data from above table shows pre-test and post-test values of Triple hop Test(THT) and VAS of subjects in group A. The pre-test mean value of THT was 19.53 and post test mean value was 22.20 This shows that the THT scores were gradually Increasing significantly p<0.0001. The pre-test mean value of VAS was 7.98, and post-test mean value was 2.98, this shows that the VAS scores were gradually decreasing significantly p<0.0001.

GRAPH-1

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PRE TEST

POST TEST

PRETEST

POST TEST

THT

VAS

**Table:2 Comparison of pre-test and post-test values of THT and VAS in group B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(GROUP B)** | | **MEAN** | **STANDARD DEVIATION** | **t VALUE** | **P VALUE** |
| Triple Hop Test (THT) | PRE TEST | 18.73 | 1.80 | 15.6758 | <0.0001 |
| POST TEST | 27.00 | 0.86 |
| VAS SCORE | PRE TEST | 8.79 | 1.63 | 18.8753 | <0.0001 |
| POST TEST | 1.28 | 0.89 |

The data from above table shows pre-test and post-test values of THT and VAS of subjects in group B. The pre-test mean value of THT was

18.73 and post-test mean value was 27.00. This shows that the THT scores were gradually increasing significantly p<0.0001. The pre-test mean value of VAS was 8.79 and post-test mean value was 1.28. This shows that the VAS scores were gradually decreasing significantly p<0.0001

# GRAPH- 2:

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PRE TEST

POST TEST

PRETEST

POST TEST

THT

VAS

**Table 3:Comparison of post-test values of THT and VAS in group A and B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **POST TEST** | | **MEAN** | **STANDARD DEVIATION** | **t VALUE** | **P VALUE** |
| Triple Hop Test (THT) | Group A | 22.20 | 1.25 | 1.9980 | <0.0001 |
| Group B | 27.00 | 0.86 |
| VAS SCORE | Group A | 2.98 | 0.25 | 1.7889 | <0.0001 |
| Group B | 1.28 | 0.89 |

The data from above table shows post-test values of THT and VAS of subjects in group A and group B. The post-test mean value of THT in group A was 22.20 and post-test mean value of THT in group B was 27.00. This shows group B has greater improvement in Increasing the Functional activity after ACL Reconstruction than group A with the p value (0.0001). The post- test mean value of VAS in group A was 2.98 and post-test mean value of VAS of group B was 1.28. This shows group B had greater improvement in reduction of pain than group A with the p value (0.0001).

# GRAPH 3

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Group-A

Group-B

Group-A

Group-B

THT

VAS

From statistical analysis made with the quantitative data revealed statistically significant difference between the Group A and Group B and also within the groups. The post-test mean value of THT in group A was 22.20 and post-test mean value of THT in group B was 27.00. This shows that THT Scores in Group B were comparatively higher than Group A,P <0.0001. The post- test mean value of VAS in group A was 2.98 and post-test mean value of VAS in group B was 1.28. This shows VAS scores in Group B were comparatively lesser than group A, P<0.0001. Statistical Analysis of Post test for pain and functional activity after ACL Reconstruction revealed that subjects who received Multidisciplinary Physiotherapy approach in Group B showed marked improvement compared to subjects who received only General ACL reconstruction protocol in Group A.

**Discussion:**

The ACL injury is the common structure that undergoes through tear or sprain, it is the strongest ligament(19,20) in the knee and helps in anterior translation. The ACL injury most commonly seen in athelete which involve sudden or changes in direction of jumping and landing. The most common games like football, basketball, downhill skiing, soccer.The person itself can hear the pop sound or feels the popping sensation when there us any injuring in the ACL. The knee becomes unstable and becomes too painful to bear weight. In USA the incidence is 100.00to 200.00per year(21,22). According to the incidence of ACL ruptures is estimated to range from 30 to 78 per 100000 person. In INDIA most common injury and was noted in 86.8% of knee injury (n=814complete, ACL tear 287 and 29 partial ACL tear(27).Depending upon the severity of ACL injury the treatment may include rest and rehabilitation exercises(23,24,25) in order to regain the strength and stability. The person with complete tear undergo through surgery (27)to replace the ligament followed by rehabilitation. The proper protocol will help to decrease the risk of recurrent injury. The current rehabilitation was more advanced with better outcomes than that of 1980s. Where it includes immediate passive movements, partial weight bearing exercises and functional exercise after reconstruction surgery. Though it was aggressive the final reports include the improved muscle strength, early function, great motion of movement. The physiotherapy plays a very crucial role in 3 stages the 1st stage before the injury in order to prevent the risk of injury. The 2nd st injury to decide whether it undergoes through immobilization phase or conservative stage. The 3rd begin after reconstruction surgery(28,29). The physiotherapy very important role after the knee injury in order to reduce inflammation, attain good muscular strength, and to avoid atrophy. The rehabilitation involves the quadriceps hamstrings co-activation ratio exercises, the regular program for patellar tendon reconstruction and also the accelerated program. According to the Shelbourne and Nitz in 1990s the patients who under one through the accelerated program rather than conservative program the outcomes are great to that of normal with fewer complications. Hence the rehabilitation not only involve the physical stability but also the psychological components are consider after the reconstruction. As the participants might feel anxiety related to the fear of injury, keeping all these in mind the rehabilitation has very important role for better strength. According to the severity the physician look into the type of graft to be used later on according the study we are considering the patients are taken according to the criteria subjects were divide them into two groups i.e, Group A and Group B As we already mentioned in procedure the group A Patients are practiced general ACL protocol along with results from vas scale and triple hop test. the group B patients are practiced by the normal ACL protocol along with the poly-metric and neuro muscular activities and with consideration of the results of triple hop test and the vas scale. All these were started the next day after reconstruction. The present study was under taken to find out the impact of the general protocol to that of the general protocol along with poly-metric and neuromuscular activities according to the statistical analysis the group B subjects shown good progress than the group A.

# Conclusion:

In this study A Multidisciplinary physiotherapy Approach to improve functional Activity after ACL Reconstruction in ACL reconstruction patients the result of the study showed that there was a significant difference between the pre and post test intervention. The study concluded that both the groups resulted in positive outcomes, but group B with ACL protocol, neuromuscular activities and polymetric activities showed a higher level of positive outcome in terms of decreasing pain and increasing functional activity when compared to group A with ACL injury protocol in ACL injury patients.

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