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A Comparative Study on the Effects of Electrical Muscle Stimulation and Strengthening Exercises of Quadriceps Muscle in Grade II ACL Injury

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ABSTRACT:

AIM

The aim of this study was to assess the effects of the effect of electrical muscles stimulation and strengthening exercises of quadriceps muscles in Grade-II anterior Cruciate ligament tear.

METHOD

A total 60 patients were divided into two groups: Group-A (N=30) & Group-B (N=30). Group-A patients were received electrical stimulation & Group-B patients were received strengthening exercises. All patients were given treatment three times per week for 15 days. Pain was measured using visual analogue scale (VAS), strength was measured by manual muscle testing (MMT) and range of motion by using Goniometer.

RESULT

The result of present study shows that physiotherapeutic exercises i.e. strengthening exercises (group B) are significantly effective in reducing pain, improving muscle power and functional activities than electrical stimulation alone (group A).

CONCLUSION

Therapeutic exercises like strengthening exercises are more effective in reducing pain, disabilities and improving range of motion in the patients with grade II ACL rear than application of electrical stimulation alone.

INTRODUCTION

The knee is classified as a gliding hinge joint, or trochoginglymos. It is capable of movement in six degrees of freedom; three rotations and three translations. Rotations are produced by flexion/extension, adduction/abduction, and internal/external rotation. Translations occur anteriorly/posteriorly, medially/laterally, and by distraction/compression. The four main ligaments of the knee are the anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), the medial collateral ligament (MCL) and the lateral collateral ligament (LCL).1 All of the four ligaments are defined as passive stabilizers of the knee, as opposed to active or dynamic stabilizers such as the muscles crossing the joint. However, despite the 12 different directions in which the knee can move, there is relatively limited range of motion for all but flexion/extension.

The ACL plays a particularly important role in stabilizing the knee joint. It attaches proximally to the poster medial surface of the lateral femoral condyle and distally to the anterior intercondylar fossa on the tibial plateau. Its main function is to resist anterior tibial translations and, to a lesser extent, rotational loads particularly near full extension. It is commonly divided into two functional bundles, named the with their terminology implying the location of their respective tibial attachment sites. It has been proposed that these two bundles have distinctly differing functions and properties. For example, the AM bundle appears to have more strongly aligned collagen fibres when loaded and is thus stronger/stiffer than the PL bundle.

The ACL has been reported to have an approximate maximum tensile strength of 1,725 ± 270 N.8 it should therefore be more than capable of withstanding normal sporting situations without rupturing.

Despite this, non-contact mechanisms appear to account for 70-88% of all ACL injuries. In the majority of cases movements are typified by slight knee flexion, a dynamic knee values loading (distal femur moves towards and distal tibia moves away from the midline of the body and some internal or external rotation of the tibia. These positions of heightened injury risk tend to occur during rapid decelerations shortly after initial ground contact from maneuvere that involve side-cutting or landing. Additionally, incidence rates are more common during competition than practice. A 14-fold higher incidence rate of ACL injuries during competition matches compared to during training has been reported in the highest division of Italian football. 69 Reasons for this may include the greater mental and physical stress of competition typified by increased external attention demands, the heightened intensity of the play, or the more vigorous physical contact in the cases of direct and indirect contact mechanisms. Nevertheless, given these reports, insufficient momentary awareness of the position of the knee and/or reactive control appears to be important with regard to ACL injury risk. It remains uncertain as to whether or not fatigue is a factor with regard to ACL injury risk. A meta-analysis which included studies of a number of different team-based ball games found that neither time in season nor time in game influenced ACL injury risk. Evidence suggests that ACL injuries may not simply be the cause of a one-off event, but in some instances may be the result of overuse which results in an accumulation of damage without the necessary time for recovery. However, more evidence is required to support these findings.

Injuries have been found to be the most likely to end a career and the ACL as the most commonly injured structure. Incidence rates for ACL injury are 68.6 per 100,000 person-years in the USA. For example, the ACL injury rate per 10,000 athlete-exposures is 2.49 among females for football (soccer) compared to 0.79 for males in the same sport and compared to 0.44 for ice hockey. In fact, females are at an approximately three times greater risk for ACL injury compared to males. The risk for a second ACL injury across both sexes has been reported to be as much as 35% over a five-year follow-up among individuals who had primary surgery at a mean age of 17.2 years. Interestingly, results from the same study show similar rates for graft ruptures (18%) compared to contra-lateral ACL injuries (17.7%), which is supported by a previous study indicating similar rates between legs.

MATERIAL & METHOD

SAMPLE

A total 60 patients with grade II ACL injury took part in this study. All the patients were selected from physiotherapy outpatient department of University Institute of Health Sciences CSJM University Kanpur as per inclusion and exclusion criteria. All the patients were diagnosed with grade II ACL injury by orthopedician. All the processes related to the study were fully explained to the patients and voluntary agreement by all the patients was obtained before study.

INCLUSION CRITERIA

- Age from 17-40 years.
- Both male/and female patients were included.
- Patients with unilateral ACL rupture not more than 16 weak.
- Able to Understand and willing to comply with the study protocol.

EXCLUSION CRITERIA

- No additional lower limb injury or any previous surgery,
- Patients suffering from any structural deformities, inflammatory disorder & Osteoarthritis.
- Patients having Pathology of Knee joint.
- Age more than 40 Years.
- Those, who have not given their consent for the study.

DATA COLLECTION:

SCREENING SESSION

In the screening session the patients were selected from different Hospital, clinics were screened they were made aware of their participation in research, and were requested to follow the protocol of the treatment decided or allotted to them. The Subject was asked to submit his consent and was called at research centre (University institute of health sciences, CSJMU, Kanpur) for the study purpose.

PRE -TEST MEASUREMENT

The Pre -test was done with the help of selected tools and parameters:

- Visual Analogue Scale (VAS) was conducted to know the severity of pain.
- Range of motion of knee joint & Goniometer.
- Manual muscle testing was used to determine the muscle power.

POST TEST MEASUREMENT

Post-test measurements were taken after the completion of the treatment duration and same tools and parameters were used for the measurements. The findings were compared with the pre-test readings in order to get the results.

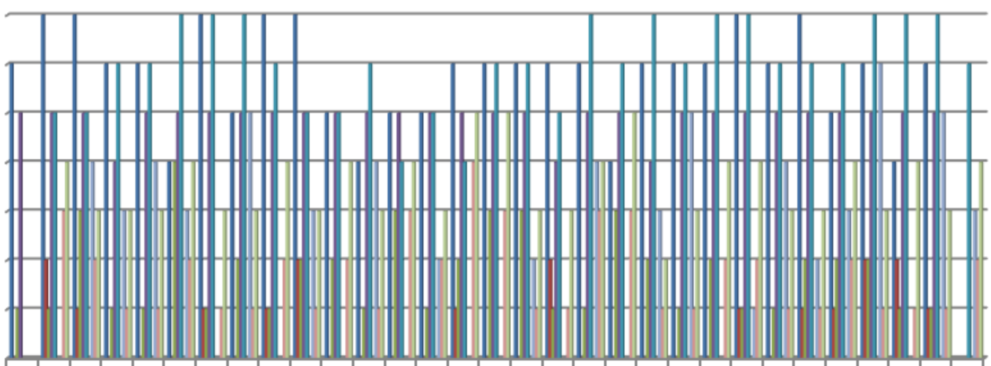
DATA ANALYSIS

Once the data collected from both the groups appropriate statistical methods and tools were used to reveal that which treatment method was more effective. The statistical tool t-test was used for data analysis.

RESULT

The result of this study shows that the physiotherapeutic exercises like strengthening exercises (group B) are more effective in reducing pain, improving muscle power and functional activities than only electrical muscle stimulation (group A).

GROUP A & B



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
VAS Pre-Test B	6	7	7	6	6	4	7	5	7	7	5	4	5	5	6	6	6	6	6	4	6	6	6	7	6	7	5	6	4	6	
VAS Post-Test B	0	2	1	0	0	0	1	0	1	2	0	0	0	0	1	0	0	2	0	0	0	0	0	1	0	1	1	2	2	1	
MMT Pre-Test B	1	1	3	1	1	4	1	2	1	2	2	1	3	1	2	3	3	1	1	3	2	1	2	1	1	2	2	2	1	1	
MMT Post-Test B	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5	5	5	5	
PRE- TEST A		5	5	6	6	7	7	7	6	5	5	6	4	5	4	6	6	5	7	6	7	6	7	7	6	6	6	7	7	7	6
PRE- TEST A																															
POST TEST A		0	4	3	4	3	0	5	0	3	0	4	0	2	0	0	2	0	4	0	3	5	0	1	4	2	3	6	0	5	3
PRE- TEST A		3	2	1	1	2	1	1	2	1	2	1	3	2	4	3	1	1	3	3	1	1	2	2	1	1	2	1	1	1	2
POST TEST A		4	3	3	3	4	3	3	4	3	4	3	4	3	5	5	3	3	4	5	2	3	4	4	3	3	4	3	4	3	4

CONCLUSION:

The study suggests that strengthening exercises of quadriceps muscle in grade II ACL tear is more effective than electrical modality like electrical muscle stimulation of quadriceps muscle in reducing pain, improving the muscle power and functional activities.

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