

Effects of Rehabilitation Program on ACL Injuries of Knee Joints in Young Adults

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Abstract

Background: The Knee is the largest and most complex joint in the body and it is the most frequently injured joint in which ligamentous injuries occur most commonly. Among them anterior cruciate ligament (ACL) is the most commonly injured ligament. Surgical reconstruction of which is not without risk. In this situation, conservative rehabilitation in the form of physiotherapy offers hope. Hence the present study was planned to find out the effect of rehabilitation program on ACL injuries. **Materials & Methods:** A total of 61 patients with knee problems diagnosed for ACL injury referred to physiotherapy department were included in the study. The Lysholm score was used to rate the subjective complaints. Exercises advised were Isometric Quadriceps exercise, Active knee extension and strengthening exercises to quadriceps and hamstrings. **Results:** Experiment group participants attended the pre-injury status after treatment in comparison to control group but somehow symptoms observed after vigorous activities in both the groups. **Conclusion:** Pain free functional activities can be achieved by rehabilitation programs although vigorous activities are somehow not symptom free, which need precautions to prevent recurrence of injury.

Keywords: ACL, Knee joint injury, ligamentous injury

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Introduction

The Knee is the largest and most complex joint in the body. The complexity is the result of fusion of three joints in one. The Knee joint is designed for mobility and stability: it functionally lengthens and shortens the lower extremity to raise and lower the body or move the foot in space. Along with the hip and ankle, it supports the body when standing. It is a primary functional unit in walking, climbing and sitting activities.

The knee joint is the most frequently injured joint. Ligamentous injuries occur most often in individuals between 20 to 40 years of age. Ligament injuries may be complete or incomplete. In a complete injury there will always be demonstrable instability and this may be frank dislocation. The incomplete ligament tear, on the other hand, provokes stress pain & is slow to heal, sometimes with a long period of disability. Failure to recognize the sign of injury

prolong the period of disability resulting in labeling the patient as neurotic.

The anterior cruciate ligament (ACL) is the most commonly injured ligament. The injury occurs when the knee is forcefully hyperextended. An ACL injury may occur in conjunction with injury to other structures, such as medial collateral ligament and medial meniscus. Recent evidence has suggested that the anterior cruciate ligament contributes to stability of the knee joint not only by its passive mechanical properties but also by a neurophysiological input^{1,2,3}. It is possible that the ligament has a proprioceptive role in knee stability. Anterior cruciate ligament deficiency (ACLD) is a condition now under close scrutiny, and its treatment raises much controversy. Surgical reconstruction of the ligament is not without risk and has demonstrated variable results^{4,5}. Thus conservative rehabilitation in the form of physiotherapy tends to be the mainstay of treatment for a large number of these patients

from clinical experience and supporting literature a variety of approaches and regimes appear to be used by physiotherapists to rehabilitate patients with ACLD. To date, however, there is no research that has been attempted to evaluate scientifically the efficacy of various regimes or methods of conservative management of ACLD. Hence the present study was planned to find out the effect of rehabilitation program on ACL injuries.

Materials and Methods

The present study was carried out at physiotherapy department Government Medical College and Hospital (G.M.C.H) Nagpur from April 2003 to April 2005. Patients with knee problems diagnosed for ACL injury referred to physiotherapy department of G.M.C.H were included in this study. Total of 61 patients were included in this study after consent to participate in the study. They were explained the nature of injury they had sustained and the nature of treatment designed for them. Referral of patients included in this study was on an average 20-30 days after the onset of injury. Signs of acute injury were absent. Hence rehabilitation program selected was suitable for moderate protection phase (controlled motion) through return to activity.

Patients with injured knee joints were examined as per proforma using various tests to confirm the diagnosis and evaluation done as per Lysholm score on 3rd, 5th, 8th week (Lysholm scoring scale). Patients were divided into 2 groups namely control and experiment groups. The Lysholm score was used to rate the subjective complaints of the patients, the score consists of eight items related to knee function. Each item as well as the total score, was analysed separately. A total score of 95- 100 points was considered normal function, a score of 84-94 points indicated symptoms in vigorous activities and a score below 84 points indicated symptoms in daily activities.^{6,7}

Control Group

Hot fomentation was advised to the patients whenever required for knee injury and the following methods were used in Control Group:

Moderate protection phase

Exercise advised were Isometric Quadriceps exercise (Position- Long sitting Repetition-20,

3 times or more if no pain is precipitated), Active knee extension (Position- sitting, Repetition-20, 3 times per day) and Strengthening exercises to quadriceps and hamstrings (Repetition- 30, 10 RM multiply 3 times per day).

Minimum protection phase

Along with exercises included in the moderate protection phase strengthening exercises progression were done according to patients ability like Partial squats, Lunges, Squatting, Cycling and Jogging.

Return to activity phase

Continued all the above mentioned exercises in moderate and minimum protection phase and precautions to be taken while doing daily routine activities were explained^{8,9}.

Experiment Group

Hot fomentation was advised to the patients whenever required for knee injury and the methods used in Experimental group are:

Elastic Knee Support (Functional Brace)

Patients were advised to use elastic knee support. Elastic knee support made out of 10 wide, strong elasticated fabric, shaped ergonomically to avoid bunching. Insertable glass filled Nylon lateral hinged splints provide lateral stability and support, but allow normal flexion of the knee joint. Anterior patellar opening and soft padding provide proper support and positioning of patella, comfort to the area. Hook loop closures provide close contoured fitting and a control on the degree of compression, apart from easy application and removal.

Moderate protection phase

Exercises: Multiple angle isometric. Close chain strengthening, LE flexibility exercises, Endurance training, Proprioceptive training, Stabilization exercises, Walk/ jog program at the end of this phase¹⁰.

Minimum protection phase

LE flexibility continued, Advance PRE strengthening, Advance closed chain exercise, Advance endurance training, Progress running program, full speed jog, and figure eight running and cutting sprints¹⁰.

Return to activity phase

Flexibility and strengthening continued; advanced as appropriate. Advance agility drills, Advance running drills were advised. Drills

specific to sport or occupation were also advised and need for protective bracing prior to return work was determined¹⁰.

Results

A total of 61 patients participated in the study among them 30 were included into control & 31 into study groups. 48 patients were suffering from isolated partial anterior cruciate ligament injury (ACL), 2 patients with partial anterior cruciate ligament+lateral meniscus injury (LMI), 6 patients with partial anterior cruciate ligament+medial meniscus injury (MMI), 5 patients with anterior cruciate ligaments injury+Medial Collateral ligament (MCL)+MMI (Table- 1).

Table- 1: Group distribution

Type of Injury	Control	Study	Total
ACL	24	24	48
ACL + LMI	1	1	2
ACL +MMI	3	3	6
ACL+ MCL +MMI	2	3	5
Total	30	31	61

The effect on limp (5 points) was graded as under according to lysholm scoring scale.5-

Table- 2: Points on LysholmScoringScale with score and percentage

ACL Points	Control Group				Experimental Group				
	0wk	3wk	5wk	8wk	0wk	3wk	5wk	8wk	
Limp	5	2(8.3)	2(8.3)	4(16.6)	15(62.5)	1(4.16)	2(8.3)	7(29.1)	22(91.6)
	3	10(41.6)	16(66.6)	20(83.3)	9(37.5)	9(37.5)	22(91.6)	17(70.8)	2(8.3)
	0	12(50)	6(25)			14(58.3)			
Pain	30			11(45.8)					19(79.16)
	25			10(41.6)			5(20.8)	5(20.8)	
	20								
	15		2(8.3)	19(79.16)	3(12.5)		2(8.3)	19(79.1)	
	10		4(16.6)	5(20.8)			6(25)		
	5	6(25)	18(75)			5(20.8)	16(66.6)		
0	18(75)				19(79.1)				
Swelling	10		4(16.6)	14(58.3)	18(75)		2(8.3)	21(87.3)	24(100)
	7								
	5	7(29.1)	15(62.5)	10(41.6)	6(25)	9(37.5)	22(91.6)	3(12.5)	
	2	17(70.8)	5(20.8)			15(62.5)			

Discussion

Previous studies conducted by Mc Daniel and Damerson (1980)¹¹, Giove et al (1983)¹², Sanderberg et al (1987)¹³, showed good results after conservative treatment. Their patients returned back to competitive levels. Somehow in present study good results were obtained in ACDL's in patients treated with rehabilitation program while patients in control group had symptoms in daily activities (Table- 3).

None, 3-Slight or periodic, 0-severe and constant. The effect on pain(during walking, running and jumping) was graded as under according to lysholm scoring scale. 30 – none, 25- inconstant and slight during severe exertion, 20- marked on giving way, 15- marked during severe exertion, 10- marked on or after walking more than 2km, 5- marked on or after walking less than 2km, 0-constant and severe. The effect on swelling (during walking, running and jumping) was graded as under according to lysholm scoring scale.10 – none, 7- with giving way, 5- on severe exertion, 2- on ordinary exertion,0- constant (Table- 2). Along with these points lysholm scoring scale included scores related to support, stair climbing, squatting, instability (during walking, running and jumping) and atrophy of thigh. When control and experimental groups were compared in after calculating the mean score according to lysholm scoring scale, proportion of patients in control group had symptoms in daily activities while in experimental group patients had symptoms in vigorous activities.

Results of present study showing no pain in daily activities and had symptoms in vigorous activities can be explained with the fact that most of the participants were non athletes and so vigorous activity were never a part of their regime. Participants in present study thus have attended the pre-injury status after treatment.The present study findings are also consistent with those of Robert Barrack (1990)¹⁴.

All the participants in experimental group reached the pre-injury status. Somehow symptoms observed in vigorous activities justify the need of long term continuation of rehabilitation exercise program by the patient; they were also instructed to avoid activities which could lead to recurrence of injury.

Table- 3: Comparison of the present study with other studies

Authors	Study	Treatment	Result
Mc Daniel & Damerson	Untreated ruptures of the anterior cruciate ligaments	Non-Operative	Patients return to high level of competition
Giove et al	Non-operative treatment of the torn anterior cruciate ligament	Non-Operative	High % of patient return to high level of competition
Sanderberg et al	Operative versus non-operative treatment of recent injuries to the ligaments of the knee	Primary repair & conservative treatment	Author could not find any significant difference after primary repair or conservative treatment
Robert Barrack et al ¹⁴	The outcome of nonoperatively treated complete tears of the anterior cruciate ligament in active young adults	Nonoperative	Majority of patient in the study had been able to continue their job, participate in sports at some level & avoid surgery
Present study		Conservative treatment	Patients had symptoms in vigorous activities

Conclusion

Participants in present study had attended the pre-injury status after treatment. Somehow symptoms observed in vigorous activities justify the need of long term continuation rehabilitation exercise program by the patient; they were also instructed to avoid activities which could lead to recurrence of injury. It can also be concluded that properly executed rehabilitation program is helpful in rehabilitation of patients suffering from injuries of various ligament of knee joint. Pain free functional activities can be achieved by rehabilitation programs although vigorous activities are somehow not symptom free, which need precautions to prevent recurrence of injury. Athletes may require surgery.

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