Effect of Monitored Physiotherapy Sessions in improving the Knee Function on ACL reconstruction among non sports Young Adults

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1. Introduction

Participation in some kind of sports right from childhood has been viewed as a health indicator in the present era [1]. This is mainly due to the rising awareness on health and disease/injury prevention. Globally 60% of knee injuries happened only in professional sports [2]. But recent years has seen a surge in knee injuries among young adults who continuously participated in one or other kind of entertaining sports on regular basis [3]. And also unattended initial knee strain or injury increases the risk of partial or complete tear in ACL [4]. With equal distribution of incidence of ACL injury among young male and female, return to sports has been the priority in 87% of male population, while most of the female neglect or do not aspire to RTS after injury/surgery [5]. This has posed a serious hitch to the public health policy because inactive life style puts a burden on the society on all the three aspects of social, economic and health aspects. While health awareness and prevention of diseases by active lifestyle has been on public sensitization, return to sports or active life after injury/ surgery falls on the shoulders of the rehab professional. With advancement in medicine and rehab protocols, the epidemiology ACLR in 100000 population has been reported as 77.4 in Australia, 52 in the United States, 37 in New Zealand, and 32 in Sweden [6,7] and in India it is 82.2 [8]. Incidence of ACL injuries in rural Indian population has been reported to have a higher incidence in male than female with two-wheeler accidents being the major attributing cause [9]. Trivial fall and twisting injuries were the second leading cause for ACL tear [10]. However urban India reported a very higher incidence of ACL tear in comparison with the periphery and also has reported to have opted for ACLR mainly due to advancement in key hole surgery and limited rest period [11]. Number of cases in unprofessional sports has seen an upsurge and the primary reason associated to inadequate warm up or practise sessions [12].

ACLR is reported to be one of the most successful and frequently performed orthopaedic surgery in India [13]. And the outcome of surgery depends solely on the surgeon's expertise and the choice of graft [14]. The information on the choice of surgery, length and diameter of the graft, surgical techniques and fixation devices has been continuously reported in Indian literature [15]. But there is paucity in other co factors which directly influences the functionality of the individual. Evolving concepts and demanding need in ACL tear has diversified the need of the exercise

protocol which plays a major role in early recovery [16].

Most of the rehabilitation programs emphasise on regaining the strength and Range of motion at the knee and hip [17]. Some programs focus on proprioception and neuromuscular coordination. While the knee joint function has been debatable to return to sports, one need to concentrate both on isokinetic and isometric component of the exercises to return to premorbid condition and active participation in sports [18]. Still the decision of RTS depend on comprehensive clinical examination, patient's cooperation and willingness to RTS and the restoration of knee function and whole body after surgery [19].

While most of the rehabilitation programs on orthopaedic cases has a definitive duration and frequency of visits for the expected results, the consensus over the frequency of visit post ACL surgery and duration of each such visit was left to the judicial choice of the physiotherapist [20]. Thus the functional outcome after a ACLR has many set-backs in reality.

The purpose of the study was to explore the implicit benefits of the monitored physiotherapy sessions in improving the knee function on ACL reconstruction among non sports young adults. Because of the escalated cases of ACLR in the recent years, there needs to be an explicit rehab protocol that can enable a person to return to sports and identify the impact of monitored and unmonitored sessions on knee function.

Material and Methodology

The research was carried out at Saveetha College of Physiotherapy. Prior to the initiation of the study the treatment protocol, informed consent documents were submitted and ethical clearance was obtained.

The sample size estimation was done at the initial design stage of the study on the basis of randomly selected results of the previous studies. Based on the parameters, the sample size was estimated to 30 participants with 15 in each group. The study employed a consecutive sampling method and the participants based on their willingness to follow the protocol were designated into the concerned groups.

The male non-athletic patients who underwent ACLR surgery and had to undergo rehab program formed the population of the study.A total of 54 patients were initially recruited for the study. All participants were made aware of the study's nature and duration. Informed return consent was obtained from each and every participant and liberty were given to withdraw from the study without any further obligation.

Based on the inclusion criteria 30 participants were finalized for the study and were randomly assigned into two groups- The control group and the Experimental group. Any male patient admitted for ACLR between 25 to 40 years of age with a scoring of 4 to 6 in Tegner physical activity scale were alone recruited for the study. Participants who showed willingness to attend all the stages of physiotherapy sessions with a regular visit of 40 sessions over a period of 3 months were assigned into the experimental group. Willingness to undergo treatment and assessment after this period alone were included into the study. Subjects who wanted to return to sports were alone included in the study. Participants who agreed to participate in 2 or 3 sessions during the initial week and from then on a weekly session for 3 months were included into the control group of the study. The participants were not influenced by the researcher on choosing the number of sessions to be attended and were given the option of choosing the participation on their own and their surgeon's approval. The participants from both the group were motivated to perform the prescribed exercises and undergo postoperative rehab program at the prescribed interval.

Participants with previous knee surgeries, fracture of lower limb, associated meniscal tear and collateral ligament injury, balance issues were excluded from the study. The demographic data of the participants included age, height, weight, BMI were found to be uniform in both the groups. The participants were evaluated for knee function with knee cincinnati scale at the starting of the session and at the completion of treatment protocol after 3 months.

The treatment protocol received ice packs, patellofemoral mobilisation, static quadriceps, static hamstring, SLR, SLR with ankle toe movement, CPM for increasing knee ROM, unaffected limb strengthening exercises for first three visits. From second week to twelth week partial weight bearing, gait training with stick, stair climbing, balance exercises on stable platform progressed to unstable platform.

(Control group 15 sessions; Experimental group 40 sessions)

Statistical Analysis

The results of the test were subjected to statistical analysis using SPSS software version 3.4.2. The `normality of the variable was verified through Shapiro-Wilk's test and the mean and Standard deviation were calculated. The paired t-test was done for within-group analysis and independent t-test for between group analysis. The demographic data was subjected to chi square analysis to determine the uniformity among the participants.

Results

The findings of the research are outlined in tables 1 and 2. The demographic information is displayed in table 3. The within group analysis shows a mean of 23.33 (1.83) against the 23.3 (1.61) in pre-test scores. The comparison of within group analysis displays a mean difference of 0.42 in the pre-test and a mean difference of 0.38 in the experimental group which is highly significant at $p \leq 0.05$. The between group analysis of the experimental group has a higher mean difference of -4.4 which is significant at $p \leq 0.05$ with a t-score of -7.64. The comparative analysis clearly shows that the experimental group who received more number of monitored sessions against the lesser number of unmonitored sessions performed well in the knee function after three months period.

Discussion

The primary aim of the study was to analyse the knee function following a ACLR after three months with monitored physiotherapy sessions that included more sessions than the unmonitored physiotherapy session who did the exercises by themselves with the guidance by the researcher.

It was hypothesized that with higher number of monitored visit might benefit the patients who desired to return to sports following a surgery among non-athletic young male adults. From the three months study conducted it was perceived that the subjects who received more number of monitored physiotherapy sessions performed well in the knee function and had more confidence in returning to unprofessional sports which is seen as a health indicator. The current study focused on knee function with similar visits and has shown improvement in knee function which could serve as base to return to sports.

The secondary outcome of the study was knee extension in surgical leg compared to the uninvolved leg also showed greater Rom in supervised sessions. This is in accordance with the current study showing a significant improvement in knee function in young non-athletic adults. The exercises followed in our study were extracted from previously published exercise protocol in various studies and hence a desirable improvement in knee function was achieved in the study.

The major strength of the study lies in drawing exercise protocol from the previous studies that had an established and reproducible result. Most of the exercises were already proven results with varied study groups. As the study was started from day 1 after surgery it was easy to follow up the participants and there was no dropout in the study. During the entire study period appropriate guidance were given to all the participants which helped in the adherence to the study. However, the study has its own limitations. The number of participants were limited to 30 and were within a specific age group. Hence a study that could be fitted into a larger group with middle aged population is necessary to generalize the results of the study. And also the application of the protocol to female participants undergoing ACLR in same age group was not dealt. Considering the disparity in the incidence and those who chose to reconstruction the study did not involve female participants.

The practicality of the study aims to apply the study results among non-professional sports persons undergoing ACLR so that they can chose to play sports for the entire life rather than quiting game after surgery. Hence the study results helps the physiotherapy professionals, surgeons and fitness coach to benefit their clients.

Conclusion

The current study concludes that a monitored physiotherapy program with more visits administered to a ACLR patients helps in regaining the knee function at the earliest with more confidence and helps them to participate in sports even after surgery confidently.

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ABSTRACT

BACKGROUND

Participation of sports by young adults has been seen as a health indicator. With active participation in sports activities, the susceptibilty to injuries has also risen leading to reconstruction surgeries. The ACL reconstruction is the first and foremost procedure that requires a long term follow up with reliable outcome measures to return to sports and regain functionality.

METHODOLOGY

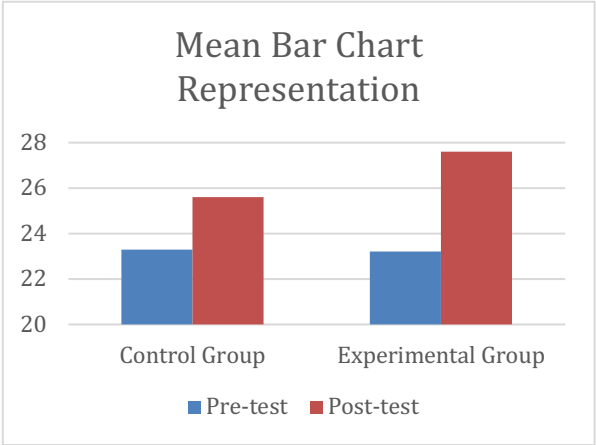
This study is a randomized control trial with consecutive sampling to determine the effect of monitored physiotherapy exercises on ACL reconstruction patients. . The study included 30 subjects randomly distributed into two groups – The control group who did the rehab program by themselves after the initial visits and the experimental group who received the rehab program under

continuous monitoring of 4 weeks a session for 3 months. The Knee Cincinnati scale was assessed immediately after surgery and after 3 months.

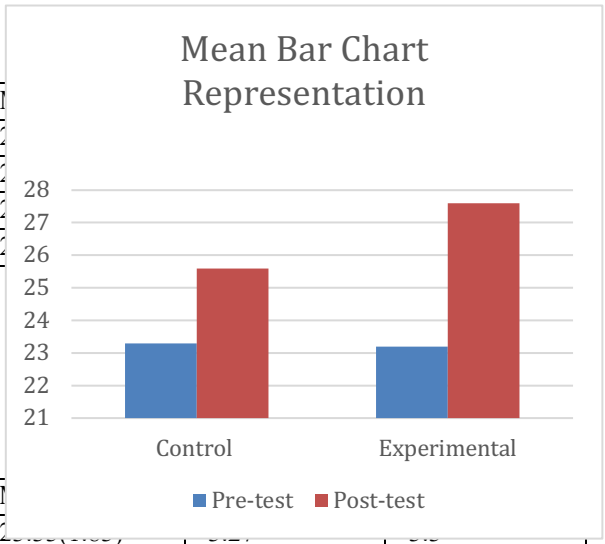
RESULTS`

The results of the study showed a significant difference knee function of the measures of the cincinatti scale in the subjects who received monitored rehab with a mean of 25.6 and 27.6. It was concluded that pain reduced whether the subjects received monitored or unmonitored rehab post operatively. But the functionality components of return to sports that greatly depended on running and jumping significantly improved only among subjects who received monitored sessions.

KEY WORDS : ACL Reconstruction, Knee Cincinnati Scale, Rehab for ACL



WITHIN GROUP ANALYSIS



Within Group Analysis – Table 1

Variable	Group	Test	
KCS	Control	Pre	
		Post	
	Experimental	Pre	
		Post	

Between Group Analysis- Table 2

Variable	Group	Test			
KCS	Control	Pre		BETWEEN GROUP ANALYSIS	
		Post	25.6(1.91)		
	Exprimental	Pre	23.2(1.61)	-4.4*	-7.64
		Post	27.6(1.58)		

Table 3 Demographic data of the participants

Characteristics	**Control Group**	**Experimental Group**
Right	9	8
Left	6	7
Age (years)	32	31
Height (m)	1.71	1.69
Weight (kgs)	61	60
BMI	29.8	29.2
Duration of Injury (months)	2.4	2.6