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COMPARISON OF ACCELERATED VERSUS TRADITIONAL ACL REHABILITATION IN IMPROVING KNEE FUNCTION AMONG FOOTBALL PLAYERS WITH ACL RECONSTRUCTION

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KEYWORDS :

INTRODUCTION

Anterior cruciate ligament (ACL) injuries are among the most prevalent and clinically significant injuries affecting the knee joint in athletic populations. Accounting for nearly 50% of all knee injuries in sports, ACL ruptures pose substantial challenges not only to the physical health of athletes but also to their performance, career longevity, and psychological well-being.[1]

In high-demand sports such as football (soccer), where rapid changes in direction, acceleration, and jumping are integral components, the incidence of ACL injuries is particularly high. Professional football injuries, in this regard, represent a major concern as they negatively impact team performance while also imposing considerable financial burdens on clubs due to treatment costs and player absence.[2]

These statistics underscore the global relevance of ACL injuries and highlight the need for effective prevention and rehabilitation strategies.ACL injuries are broadly categorized into contact and non-contact mechanisms, with non-contact injuries accounting for approximately 70–80% of cases.[6] Non-contact ACL injuries typically occur during high-risk movements such as sudden deceleration, pivoting, cutting, or landing from a jump.

These patterns are often exacerbated by inadequate neuromuscular control, especially when the hamstrings and hip stabilizers fail to activate effectively to counteract external forces. Over time, such deficits may lead to compensatory movement strategies that further increase injury risk. Management of ACL injuries often involves surgical reconstruction followed by a structured rehabilitation program aimed at restoring knee function and enabling a safe return to sport. These approaches focus on early mobilization, progressive loading, and functional training, with the goal of expediting recovery while minimizing complications such as joint stiffness and muscle atrophy.[16-18]

Although accelerated rehabilitation has gained popularity, there is still limited and conflicting clinical evidence comparing its outcomes to those of traditional protocols, particularly in athletic populations such as football players. Concerns remain about the safety and effectiveness of accelerated approaches, including potential risks of graft failure or inadequate recovery if progression is too rapid.

Objectives of the Study

- To find the effectiveness of accelerated acl rehabilitation in improving knee function among football players with acl injury
- To find the effectiveness of traditional acl rehabilitation in improving knee function among football players with acl injury
- To compare the effectiveness of accelerated acl rehabilitation versus traditional acl rehabilitation in improving knee function among football players with acl injury

METHODOLOGY

MATERIALS AND METHOD

7.1 Study Design

Pre-post comparative study

7.2 Methodology

Study Subjects: football players with ACL injury
Sample Size: 42

Sample size was calculated using G*Power software (Version 3.1, Kiel University, Germany). Using a medium effect size (f = 0.25), an alpha level of 0.05, power of 0.80, and assuming a moderate correlation (r = 0.5) among repeated measures, the minimum required sample size was estimated to be 34 participants (17 per group). Accounting for a 20% potential dropout rate, the total sample size was adjusted to 42 participants (21 per group)

Study Setting and Source of Data

Study will be carried out in Florence college of rehabilitation sciences
Sampling Method: Random sampling
Study Duration: 6 months
Sample Selection: Simple random sampling computerized randomization

Inclusion Criteria

- Age 18-35 years
- Gender: Male
- Football players
- Isolated ACLR with hamstring tendon autograft
- Knee full extension, good patellofemoral mobility, and active control of the quadriceps
- Voluntary to participate in the study

Exclusion Criteria

- Patients with concomitant lesions such as meniscal tears and collateral ligament injuries.
- Patients with previous knee injuries in both the affected and contralateral knee.
- History of lower limb surgeries.
- Patients with cognitive impairments

Procedure

The study will obtain ethical approval from the institutional ethical committee, and patients will provide written consent (ANNEXURE –II) by signing a form. Demographic data and physical examination will be recorded for 42 participants.

Group A (Accelerated ACL Rehabilitation)[59]

During Phase 1 (Week 1), rehabilitation begins immediately after surgery with cryotherapy (10 minutes every 2 hours), ankle pumps (10 repetitions × 3 sets, 4–5 times daily), quadriceps setting, straight leg raises, heel and wall slides (0°–90°), patellar mobilization in all directions, and leg elevation with a pillow under the heel starting on postoperative day 1 (10–15 minutes, 3–4 times daily). Gait normalization is initiated from day 4 as tolerated, with the goal of walking without crutches by day 7 if pain permits. During Phase 2 (Weeks 2–9), cryotherapy is continued as

needed while maintaining full knee extension and patellar mobility.

Group B (Coventional Exercise)

The rehabilitation protocol is progressed according to clinical milestones. During days 1–3, the focus is on achieving 0°–90° knee range of motion, initiating quadriceps activation, and walking without crutches through wall slides, patellar mobilizations, active superior patellar glides, neuromuscular electrical stimulation, and gait training. By week 2, the goals are full knee extension, knee flexion greater than 110°, independent cycling and stair climbing, normal walking with full knee extension, reciprocal stair negotiation, and a Knee Outcome Survey–

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis.

Table- 4 Comparison of Koos Score Within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - Test	Significance
	Mean	S.D	Mean	S.D		
Group- A	29.68	3.94	47.63	3.09	-24.14	.001**
Group- B	29.73	3.57	43.57	4.20	-13.37	.001**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B.There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$.

Table – 5 Comparison of Hop Test Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - Test	Significance
	Mean	S.D	Mean	S.D		
Group- A	72.57	4.27	87.47	8.14	-8.40	.001**
Group- B	71.47	4.41	80.00	4.09	-26.01	.001**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B.There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$.

Table – 6 Comparison of Lysholm Knee Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - Test	Significance
	Mean	S.D	Mean	S.D		
Group- A	72.63	4.36	89.31	4.83	-17.93	.001**
Group- B	71.52	4.57	80.00	4.26	-18.37	.001**

(**- $P \leq 0.05$ - Significant).

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B.There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$.

On comparing the Mean Values of Group A & Group B on KOOS Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows 47.63 ± 3.09 which has the higher mean value is more effective than (Group B) 43.57 ± 4.20 at $P \leq 0.05$. Hence the null hypothesis is rejected.

On comparing the Mean Values of Group A & Group B on Hop Test Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows 87.47 ± 8.14 which has the higher mean value is more effective than (Group B) 80.00 ± 4.09 at $P \leq 0.05$. Hence the null hypothesis is rejected.

On comparing the Mean Values of Group A & Group B on Lysholm Knee Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows 89.31 ± 4.83 which has the higher mean value is more effective than (Group B) 80.00 ± 4.26 at $P \leq 0.05$. Hence the null hypothesis is rejected.

On comparing Pre test and Post test within Group A & Group B on KOOS Score, Hop Test Score & Lysholm Knee Score shows significant difference in the mean values at $P \leq 0.05$

DISCUSSION

The present study aimed to compare the effectiveness of accelerated anterior cruciate ligament (ACL) rehabilitation versus traditional rehabilitation in improving knee function among football players following ACL reconstruction. The findings suggest that both rehabilitation protocols are effective in enhancing knee function, reducing disability, and improving return to activity.

Following the intervention period, both rehabilitation groups demonstrated statistically significant improvements in all measured outcome variables. These findings indicate that structured physiotherapy following ACL reconstruction is effective in restoring knee function regardless of the rehabilitation protocol employed. Improvements observed in this study are likely due to progressive strengthening exercises, neuromuscular re-education, restoration of joint mobility, proprioceptive training, balance exercises, and functional activity progression incorporated into both rehabilitation protocols. These interventions collectively contribute to enhanced muscle activation, improved joint stability, reduced pain, and better functional performance.

The findings of this study indicate that both rehabilitation protocols resulted in statistically significant improvements in knee function, as assessed using outcome measures such as KOOS, Tegner Lysholm score, Side Hop Test, and knee range of motion.

In conclusion, both accelerated and traditional ACL rehabilitation protocols are beneficial in improving knee function among football players following ACL injury. Accelerated rehabilitation may offer an advantage in promoting early recovery and return to activity, whereas traditional rehabilitation ensures a gradual and controlled progression with comparable long-term outcomes.

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