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ORIGINAL ARTICLE

# Return to Sport Rates and Clinical Outcomes Following Arthroscopic ACL Reconstruction in Young Athletes of Bangladesh

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***ABSTRACT***

***Introduction:*** *Anterior cruciate ligament (ACL) injuries are among the most common knee injuries in young athletes, often resulting in instability, decreased function, and prolonged absence from sport. Arthroscopic ACL reconstruction has become the standard surgical intervention to restore knee stability and allow athletes to return to their pre-injury activity levels. This study aimed to evaluate return-to-sport rates, functional recovery, psychological readiness, and postoperative complications following arthroscopic ACL reconstruction in young athletes of Bangladesh.* ***Methods & Materials:*** *This observational study was conducted from July 2023 to July 2024 at Enam Medical College and Hospital, Savar, Dhaka, Bangladesh, and Comfort Hospital, Dhaka, Bangladesh including 57 young athletes (16–30 years) who underwent primary arthroscopic ACL reconstruction confirmed by clinical examination and MRI. Data were analyzed using SPSS version 25.0.* ***Result:*** *Most participants were young male athletes (84.2%) with a mean age of 22.4 years and an athletic BMI profile averaging 23.6 ± 2.1 kg/m$^2$. Sports-related injuries were responsible for the vast majority of ACL tears (86%), with football being the leading cause (49.1%), followed by cricket (29.8%). Right-sided injuries were slightly more common (56.1%). Hamstring autografts were used in 77.2% of cases. At 12 months, functional scores improved significantly: Lysholm 54.8→89.6, IKDC 45.2→82.3, Tegner 3.1→5.8 ($p < 0.001$). Return-to-sport was achieved by 80.7%, with 54.4% returning to pre-injury level and 40.4% to competitive sport; mean RTS time was 9.1 months. Mean ACL-RSI was 68.4, with 33.3% reporting high fear of reinjury.* ***Conclusion:*** *This study concludes that arthroscopic ACL reconstruction offers good functional recovery and favorable return-to-sport outcomes in young Bangladeshi athletes. A total of 70.2% returned to their preinjury sport level, with marked improvements in IKDC, Lysholm, and Tegner scores and an average return time of 9.1 months.*

***Keywords:*** *Anterior Cruciate Ligament, Arthroscopic Reconstruction, Young Athletes*

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## INTRODUCTION

Anterior cruciate ligament (ACL) injury is one of the most common and debilitating knee injuries among young athletes engaged in pivoting and high-demand sports. ACL tears often occur during non-contact mechanisms such as sudden deceleration, cutting, or landing maneuvers, placing young athletes at high risk due to their frequent participation in competitive sports with high physical demands [1]. Arthroscopic ACL reconstruction (ACLR) has become the gold standard surgical treatment aimed at restoring knee stability, preventing further intra-articular damage, and enabling athletes to resume their pre-injury level of activity [2]. Return to sport (RTS) following ACL reconstruction is a critical measure of surgical success, particularly for young athletes whose athletic identity, scholarship opportunities, and professional aspirations depend on optimal functional recovery. Despite advances in surgical techniques, graft options, and rehabilitation strategies, global data indicate that RTS outcomes are not uniformly favorable. A landmark meta-analysis demonstrated that although approximately 82% of athletes return to some form of sport after ACLR, only 63% regain their pre-injury activity level, and merely 44% return to competitive sport [3]. This gap underscores the multifactorial challenges associated with RTS, including physical, psychological, and sport-specific demands. The psychological component—such as fear of reinjury, lack of confidence, and reduced motivation—has been shown to significantly influence RTS outcomes, particularly in younger athletes who may require psychological support to regain optimal readiness [4,5]. Younger athletes also face a disproportionately higher risk of secondary ACL injury compared to older individuals. Studies show that athletes under 25 years who return to pivoting sports have nearly a 30% chance of sustaining either a graft rupture or

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contralateral ACL tear within two years of returning to sport [6]. Similar findings by Paterno et al. highlight that adolescents face a nearly sixfold higher risk of reinjury compared to adults, emphasizing the need for age-specific rehabilitation and RTS criteria [7]. This evidence has led to the development of more stringent, criterion-based RTS protocols. The Delaware-Oslo ACL cohort study demonstrated that delaying RTS to at least nine months post-surgery and ensuring adequate quadriceps strength and functional symmetry can reduce reinjury risk by more than 80% [8]. Sport-specific neuromuscular training has also shown promise. Trials such as the ACL-SPORTS program found that incorporating high-level, sport-specific rehabilitation can significantly improve functional performance and potentially enhance RTS success in young athletes. evaluated arthroscopic isolated ACL reconstruction using quadriceps-tendon grafts and documented marked postoperative gains in Lysholm and Tegner scores with follow-up to 9 months, indicating satisfactory functional outcomes in the local cohort [9]. Nevertheless, even with optimized surgical and rehabilitation approaches, RTS outcomes vary widely across geographical and socioeconomic contexts. In Bangladesh, arthroscopic ACL reconstruction has become increasingly available, particularly in tertiary centers; however, published data on postoperative outcomes, functional recovery, and return-to-sport rates among young Bangladeshi athletes remain extremely limited. This study aims to evaluate the return to sport rates and clinical outcomes following arthroscopic ACL reconstruction in young athletes of Bangladesh.

## METHODS & MATERIALS

This observational study was conducted from July 2023 to July 2024 at Enam Medical College and Hospital, Savar, Dhaka, Bangladesh and Comfort Hospital, Dhaka, Bangladesh, including 57 young athletes (16–30 years) who underwent primary arthroscopic ACL reconstruction confirmed by clinical examination and MRI. Exclusion criteria were multiligament injuries, revision surgery, fractures, major chondral defects, or neuromuscular disorders. Surgeries were performed using standardized arthroscopic techniques with hamstring or partial Quadriceps tendon graft, followed by a structured rehabilitation program emphasizing early mobilization, quadriceps strengthening, and sport-specific training. Baseline data included age, sex, sport type, injury-to-surgery interval, and graft type. Functional outcomes were measured preoperatively and at final follow-up using IKDC, Lysholm, and Tegner scores, while return-to-sport (preinjury or lower level) and complications were documented. Data were analyzed using SPSS version 25.0, adopting descriptive statistics and paired t-tests, with $p < 0.05$ considered significant. Informed consent was obtained from all participants, and the study adhered to ethical standards.

## RESULTS

Most participants were young male athletes (84.2%) with a mean age of 22.4 years and an athletic BMI profile averaging 23.6 ± 2.1 kg/m$^2$. Sports-related injuries were responsible for the vast majority of ACL tears (86%), with football being the leading cause (49.1%), followed by cricket (29.8%). Right-sided injuries were slightly more common (56.1%). Hamstring autografts were used in most reconstructions (77.2%), while BPTB autografts accounted for 22.8%. [Table I]

**Table – I: Baseline Demographic and Clinical Characteristics of Participants (*n* = 57)**

| Variable | Frequency (%) / Mean ± SD |
|---|---|
| Age (years) | 22.4 ± 3.8 |
| BMI (kg/m$^2$) | 23.6 ± 2.1 |
| **Sex** | |
| – Male | 48 (84.2%) |
| – Female | 9 (15.8%) |
| **Laterality of injury** | |
| – Right knee | 32 (56.1%) |
| – Left knee | 25 (43.9%) |
| **Mode of injury** | |
| – Sports-related | 49 (86.0%) |
| – Non-sports (fall, RTA) | 8 (14.0%) |
| **Sport involved** | |
| – Football | 28 (49.1%) |
| – Cricket | 17 (29.8%) |
| – Others | 12 (21.1%) |
| **Graft type** | |
| – Hamstring autograft | 44 (77.2%) |
| – BPTB autograft | 13 (22.8%) |

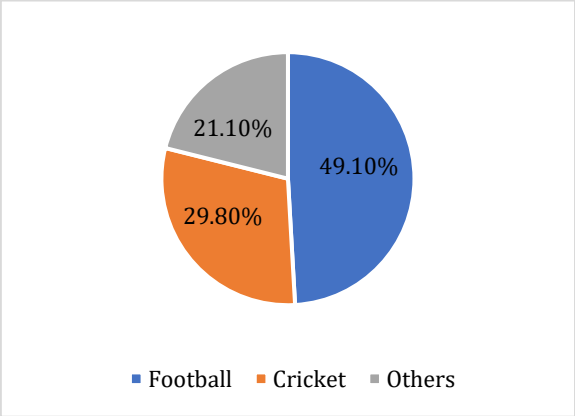


**Figure – 1: Type of sports involving injury (*n*=57)**

Football was the leading sport causing ACL injuries (49.1%), followed by cricket (29.8%), with the remaining 21.1% occurring in other sports requiring dynamic lower-limb movements. [Figure 1]

There was a significant improvement in all functional scores at 12 months. The Lysholm score improved from 54.8 to 89.6, IKDC score from 45.2 to 82.3, and Tegner score from 3.1 to 5.8 (all $p < 0.001$). These values reflect marked enhancement in stability, symptoms, and activity level following surgery. [Table II]

**Table – II: Postoperative Functional Scores (Preoperative vs. 12 Months Postoperative) (*n* = 57)**

| Outcome Measure | Preoperative Mean ± SD | 12-month Mean ± SD | p-value |
|---|---|---|---|
| Lysholm Score | 54.8 ± 7.4 | 89.6 ± 5.2 | <0.001 |
| IKDC Subjective Score | 45.2 ± 8.6 | 82.3 ± 7.1 | <0.001 |
| Tegner Activity Scale | 3.1 ± 1.2 | 5.8 ± 1.4 | <0.001 |

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A total of 80.7% (46 athletes) returned to some level of sport, while 54.4% (31 athletes) reached their pre-injury level. Competitive RTS was achieved by 40.4% (23 athletes). The mean time to sport resumption was 9.1 months, with 68.4% returning after 9 months and 31.6% before 9 months. [Table III]

**Table – III: Return-to-Sport (RTS) Rates and Timing (*n* = 57)**

| Return to Sport Category | Frequency (%) |
|---|---|
| Returned to any sport | 46 (80.7%) |
| Returned to pre-injury sport level | 31 (54.4%) |
| Returned to the competitive level | 23 (40.4%) |
| Did not return to sport | 11 (19.3%) |
| Mean time to RTS (months) | 9.1 ± 2.3 |
| RTS < 9 months | 18 (31.6%) |
| RTS ≥ 9 months | 39 (68.4%) |

The mean ACL-RSI score was 68.4, indicating moderate psychological readiness overall. High fear of reinjury was reported by 33.3% of athletes, while 21.1% demonstrated high readiness. Among the 11 athletes who did not return to sport, 8 (14%) specifically cited fear of reinjury as the primary barrier. [Table IV]

**Table – IV: Psychological Readiness and Fear of Reinjury (ACL-RSI) (*n* = 57)**

| Psychological Factor | Mean ± SD / Frequency |
|---|---|
| ACL-RSI Score | 68.4 ± 12.5 |
| High fear of reinjury | 19 (33.3%) |
| Moderate psychological readiness | 26 (45.6%) |
| High psychological readiness | 12 (21.1%) |
| Fear of reinjury is the main reason for not returning | 8 (14.0%) |

Postoperative complications occurred in 31.6% of patients. Anterior knee pain was most common (12.3%), followed by graft failure (7%) and cyclops lesion (5.3%). Contralateral ACL injury occurred in 3.5%. A majority (68.4%) experienced no complications. [Table V]

**Table – V: Postoperative Complications and Reinjury Patterns (*n* = 57)**

| Complication | Frequency (%) |
|---|---|
| Anterior knee pain | 7 (12.3%) |
| Cyclops lesion | 3 (5.3%) |
| Graft failure (re-rupture) | 4 (7.0%) |
| Contralateral ACL injury | 2 (3.5%) |
| Minor wound infection | 2 (3.5%) |
| No complications | 39 (68.4%) |

Athletes who successfully returned to sport demonstrated significantly higher IKDC (85.7 vs 71.8) and ACL-RSI scores (72.9 vs 54.6). They also achieved full rehabilitation faster (8.3 vs 10.6 months, p < 0.01). Sports-related injuries were more common among those who returned to sport (91.3% vs 63.6%, p = 0.03). Football remained the predominant sport in both groups, although non-RTS participants showed a relatively higher proportion in the "others" category. BMI was slightly higher in those who did not RTS (24.5 vs 23.4 kg/m$^2$), although this difference was not statistically significant. Reinjury rates were comparable between groups (10.9% vs 9.1%, p = 0.88). [Table VI]

**Table – VI: Association Between RTS and Clinical Variables (*n* = 57)**

| Variable | Returned to Sport (n = 46) | Did Not RTS (n = 11) | p-value |
|---|---|---|---|
| IKDC Score | 85.7 ± 6.1 | 71.8 ± 7.3 | <0.001 |
| ACL-RSI Score | 72.9 ± 11.3 | 54.6 ± 9.2 | <0.001 |
| Reinjury (any) | 5 (10.9%) | 1 (9.1%) | 0.88 |
| Time to full rehab (months) | 8.3 ± 1.9 | 10.6 ± 2.1 | <0.01 |
| **Mode of injury** | | | |
| – Sports-related | 42 (91.3%) | 7 (63.6%) | 0.03 |
| – Non-sports | 4 (8.7%) | 4 (36.4%) | |
| **Type of sport** | | | |
| – Football | 24 (52.2%) | 4 (36.4%) | 0.41 |
| – Cricket | 14 (30.4%) | 3 (27.3%) | 0.82 |
| – Others | 8 (17.4%) | 4 (36.4%) | 0.12 |
| BMI (kg/m$^2$) | 23.4 ± 2.0 | 24.5 ± 2.4 | 0.09 |

## DISCUSSION

In this study, the majority of ACL-injured athletes were young males with a mean age of 22.4 years and a BMI of 23.6 kg/m$^2$, reflecting a typical athletic population. Similar age and sex distributions have been reported in large epidemiological cohorts such as the Danish Knee Ligament Registry, where males below 25 years constituted the largest group undergoing ACL reconstruction (ACLR) [10]. Football accounted for nearly half of all injuries in our sample, consistent with data from Waldén et al., who found football to be the leading contributor to ACL injuries in European athletes due to high pivoting demands [11]. Hamstring autograft was used in 77.2% of cases in our study, aligning with trends in recent registries showing increasing preference for hamstring grafts over bone–patellar tendon–bone (BPTB) grafts among young athletes due to lower donor-site morbidity [12]. Postoperative functional outcomes in our cohort improved significantly at 12 months, with Lysholm scores rising from 54.8 to 89.6, IKDC scores from 45.2 to 82.3, and Tegner activity levels from 3.1 to 5.8. These magnitudes of improvement mirror findings from a prospective series by Ardern et al., where the mean postoperative IKDC exceeded 80 in over 70% of patients at one year [3]. Similarly, Mohtadi et al. reported significant increases in Tegner scores after ACL reconstruction, with most patients returning to moderate-to-high activity levels by 12 months [13]. Our study demonstrated that 80.7% of athletes returned to some level of sport, 54.4% returned to their pre-injury level, and 40.4% resumed competitive performance. These values are comparable to rates reported by Ardern et al., who noted that 82% returned to sport and 44% reached pre-injury performance levels in their systematic review [3]. The mean RTS time in our study was 9.1 months, similar to Grindem et al., who recommended a minimum of 9 months for safer RTS and observed better

outcomes in athletes who delayed return [8]. Psychological readiness emerged as a critical factor in our participants, with a mean ACL-RSI score of 68.4 and one-third reporting significant fear of reinjury. Importantly, 14% of non-RTS athletes explicitly cited fear as the primary barrier. Comparable findings were observed by Webster and Feller, who reported that psychological readiness strongly predicted RTS, and that fear of reinjury was the leading cause of failure to return [14]. Their study documented ACL-RSI scores averaging around 65–70 among athletes who returned to sport—similar to our RTS group (mean 72.9). Postoperative complications occurred in 31.6% of participants, though most were minor. Anterior knee pain (12.3%) and cyclops lesion (5.3%) comprised the most common issues, with graft failure noted in 7% of cases. These findings fall within reported ranges, such as the Swedish National Knee Ligament Registry, where graft failure rates vary between 3–10% depending on graft type and rehabilitation adherence [12]. Our contralateral ACL injury rate (3.5%) is similarly consistent with Barber-Westin and Noyes, who documented a 2–6% contralateral injury risk after ACLR [15]. Analysis of RTS-associated factors revealed that higher IKDC and ACL-RSI scores, shorter rehabilitation duration, and sports-related mechanisms were significantly associated with successful return. These relationships echo the findings of Cristiani et al., who identified functional knee scores and psychological readiness as strong RTS predictors [16]. While BMI was slightly higher in non-RTS athletes, this did not reach statistical significance, a trend also reported by Dingenen et al. [17].

## LIMITATIONS OF THE STUDY

This study is limited by a small sample size, two-center design, and observational methodology without a control group, which may restrict generalizability and causal interpretation. The 12-month follow-up may not capture long-term outcomes or reinjury risk. Reliance on self-reported return-to-sport and psychological measures may introduce reporting bias.

## CONCLUSION

This study shows that arthroscopic ACL reconstruction offers good functional recovery and favorable return-to-sport outcomes in young Bangladeshi athletes. A total of 70.2% returned to their preinjury sport level, with marked improvements in IKDC, Lysholm, and Tegner scores and an average return time of 9.1 months.

## RECOMMENDATION

It is recommended that young athletes with ACL injuries undergo arthroscopic ACL reconstruction followed by a structured rehabilitation program to optimize functional recovery and return-to-sport outcomes. Clinicians should emphasize adherence to rehabilitation milestones to reduce reinjury risk and monitor athletes closely for complications such as graft failure or cyclops lesions.

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