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Preoperative Knee Self-Efficacy Scale as a predictor of outcome following anterior cruciate ligament reconstruction: A short-term study

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Abstract:

BACKGROUND: The purpose of this study was to validate the possibility for preoperative self-efficacy of knee function measured by the Knee Self-Efficacy Scale (K-SES) to foresee patient outcome in terms of patient-reported outcome (PRO) scores at 2 years after an anterior cruciate ligament (ACL) reconstruction (ACLR).

MATERIALS AND METHODS: This was a prospective study of cohort of 90 patients who underwent primary ACLR using hamstring tendon graft by a single team of surgeons over a period of 2 years at a government teaching tertiary care hospital. Demographic data (age and sex) and self-efficacy of knee function using K-SES were measured before surgery. Functional outcome were assessed using Tegner Lysholm Knee (TLK) Scoring Scale, Knee Injury and Osteoarthritis Outcome Score (KOOS), and International Knee Documentation Committee (IKDC) score at every scheduled follow-up after surgery. The mean of K-SES, TLK, IKDC, and KOOS scores was calculated. Pearson correlation coefficient was calculated to find out the relation between K-SES and the three knee subjective scores independently. Two-tailed test was used to compute the statistical significance of parameter deduced from data set.

RESULTS: There was a strong positive correlation between K-SES and the three subjective scores independently. Two-tailed tests were statistically significant for all the three correlations.

CONCLUSION: Evaluation of knee function using K-SES preoperatively is of predictive value for good functional outcome at 2 years after ACLR.

Keywords:

Anterior cruciate ligament, International Knee Documentation Committee score, Knee Injury and Osteoarthritis Outcome Score, Knee Self-Efficacy Scale, Tegner Lysholm Knee Scoring Scale

Introduction

Anterior cruciate ligament reconstruction (ACLR) is one of the most commonly performed arthroscopic surgeries in orthopedics,^[1] and anterior cruciate ligament (ACL) injuries are one of the most researched topics in orthopedic publications with annual incidence of ACL tears as 68.6/100,000 person-years following adjustment to age and gender.^[2] These injuries are often seen in young active

individuals who aspire to return to their demanding work as early as possible. The past decade has seen enormous work in ACL surgical techniques and rehabilitation protocols which subsequently resulted in improved patient outcomes; however, ACL surgery still requires vigorous and extensive rehabilitation efforts from patients.^[3]

Recently, a Multicenter Orthopaedic Outcomes Network cohort in 2012 reported that out of 63%–69% of athletes who returned to play football at high school or college level following ACLR; just 43% of them reported

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returning to similar performance level.^[4] Fifty percent of the nonreturners in this study specified fear of re-injury as a reason, and the authors advocated an undervalued role of psychological factors in getting athletes back to the playing fields.^[4] The psychological factors, especially the one which is correlated to how the patients think of their knee function, have a significant impact on postoperative outcome.^[5] For instance, an athlete who fears re-injuring his or her knee and lacks confidence in the function of the reconstructed knee shall eventually fall short of accomplishing their goals and culminates into dissatisfaction.^[6] The concept of self-efficacy was first given by Bandura,^[7] and later, Crossman^[8] propounded the significance of self-efficacy in assessing rehabilitation outcome following sports injuries. Thomee *et al.*^[9] defined self-efficacy as a perception of one's aptness to carry out a task, rather than an assessment of whether one can or does execute the task.^[9] The significance of self-efficacy beliefs for patients with an ACL injury was discussed by Evans and Hardy, but they did not have any specific instrument.^[10] It was only in 2006 that Knee Self-Efficacy Scale (K-SES) as an instrument for measuring self-efficacy in patients with an ACL injury was recommended.^[9] Literature is concordant in assuming unequivocal role of psychological factors in recovery following ACLR, but it has limited studies mentioning correlation between preoperative psychological assessment and postoperative functional outcome.

The purpose of this study was to find out the effect of preoperative K-SES as a predictor of functional outcome following ACLR. Our hypothesis is that clinical outcome following ACLR can be predicted by how patients perceive their knee self-efficacy preoperatively.

Materials and Methods

This was a prospective study with sample size of 90 patients who underwent primary ACLR between January 2016 and April 2018 at a government teaching tertiary care hospital. The study had prior approval from IRB. The data collected during outpatient visit during preoperative evaluation included age, sex, side of injury, comorbidities if any, and self-efficacy of knee function using K-SES. The K-SES consists of 22 items in four sections and is a self-administered instrument. The total scores were calculated and then divided by the number of items.^[9]

Our study had included all skeletally mature patients with ACL tear and minimum 2-year follow-up. We excluded patients with bilateral ACL tear, meniscal injury, associated ligament injury like medial collateral ligament, lateral collateral ligament, posterior cruciate ligament or injury involving posterolateral corner, previous history of ACL repair, or reconstruction.

The sports unit of the department performed all the surgeries. Arthroscopic ACLR was performed using quadruple-looped hamstring autograft. We had used the surgical technique as described by S. Kumar *et al.*^[11] for accurate positioning of femoral and tibial tunnel using the indigenously made grid on a transparency sheet and C-arm. Adjustable loop endobutton was used to fix the graft tendon to femur and bioabsorbable screw as suitable to the tunnel diameter was used to fix graft tendon to the tibia. All patients followed similar standard hospital ACL rehabilitation protocol. The patients were followed up postoperatively at 3, 6, 12, and 24 months, respectively. Patients were evaluated objectively with Lachman test, measurement of range of motion. Subjective data collected included Tegner Lysholm Knee (TLK) Scoring Scale, Knee Injury and Osteoarthritis Outcome Score (KOOS), and International Knee Documentation Committee (IKDC) score.

Statistical analysis was done using the Statistical package for the social sciences (SPSS) version 21.0 IBM manufacturers, Chicago, USA. The mean of age, K-SES, TLK, IKDC, and KOOS scores were calculated. Pearson correlation coefficient was measured to find out the relation between K-SES and the three individual scores independently. Two-tailed test was used to assess the statistical significance of parameter deduced from the statistics.

Results

The sample size was 90 patients. There were 85 male (94.44%) and 5 female (5.56%) with age ranging from 17 years to 50 years. The mean age was 28 years. The minimum follow-up was of 2 years. The K-SES score ranged from 2.00 to 5.86 with a mean of 4.01. The three postoperative scores at the end of 2 years were taken into consideration. TLK Scoring Scale is graded as: <65 – poor, 65–83 – fair, 84–90 – good, and >90 – excellent. The mean of TLK score was 89.54 which was good. KOOS score interpretation is 0–100 (100 as excellent) while IKDC score interpretation is 0–100 (100 as excellent). The mean of IKDC score was 66.57, while for KOOS score, the mean was 84.89.

Pearson correlation (*r* value) revealed a positive linear correlation between K-SES and TLK score [Figure 1], K-SES and IKDC score [Figure 2], and K-SES and KOOS score [Figure 3], respectively, thereby implying that with the increase in K-SES score, all the three subjective scores increase significantly – $P < 0.001$ for TLK, IKDC, and KOOS scores.

Discussion

The application of PRO measures to evaluate outcome following an intervention has become very common in

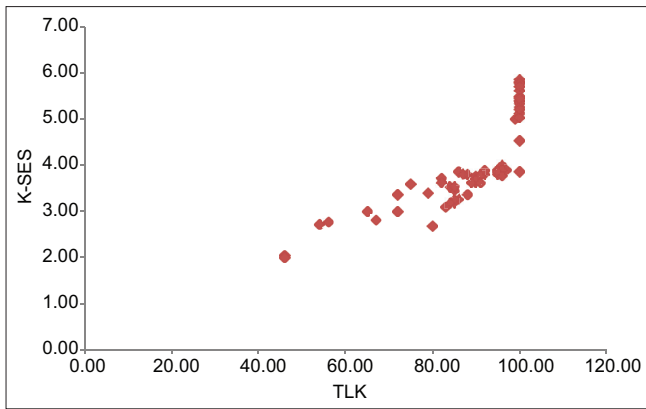


Figure 1: Scattered plot depicting linear correlation between Knee Self-Efficacy Scale and Tegner Lysholm Knee score

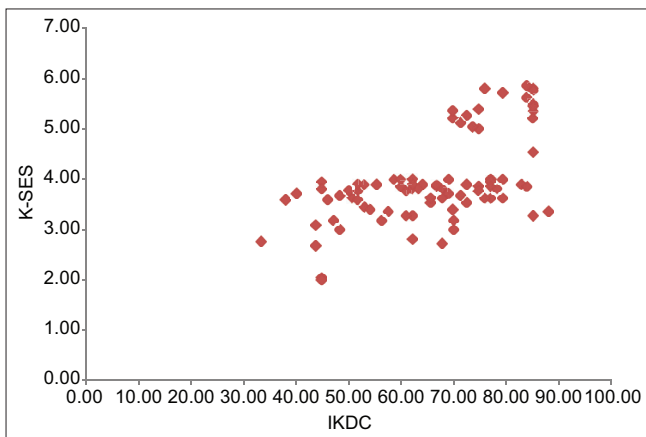


Figure 2: Scattered plot depicting linear correlation between Knee Self-Efficacy Scale and International Knee Documentation Committee

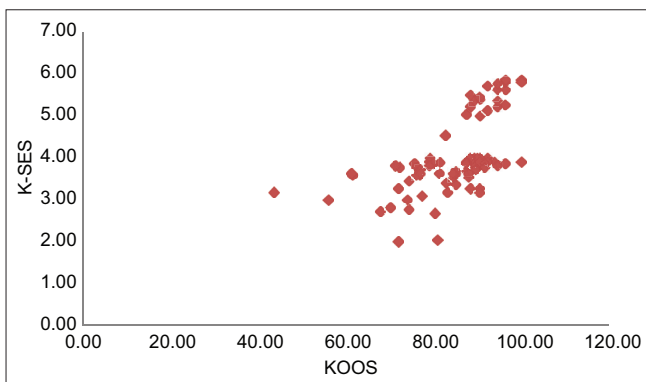


Figure 3: Scattered plot depicting linear correlation between Knee Self-Efficacy Scale and Knee Injury and Osteoarthritis Outcome score

medical practice and this has given the patients a voice in their health management. There are numerous factors that have been linked to affect the adherence to rehabilitation such as self-motivation, efficacy, self-efficacy, emotional adjustment, and social support for rehabilitation.^[12-15] The K-SES has demonstrated good reliability and validity for outcomes but has not been specifically validated for return to sport after ACLR.^[16] The last two decades has seen

tremendous research in exploring the role of psychological factors in rehabilitation following sports injuries.

Our findings are in line with the study done by Thomee *et al.*^[17] who had assumed that one of the prognostic value for an athlete's return to acceptable levels of physical activity, symptoms and muscle function at 1 year after ACLR is there preoperative perceived self-efficacy of knee function. There are numerous studies to support the notion that strengthening the patient's self-efficacy of performance for physical work during rehabilitation shall reduce the consequences of that specific illness.^[18-20]

Another study reported by Christino *et al.*^[21] concluded that self-esteem levels and locus of control had significant relationships with functional test performance and validated outcome measures after ACLR and found that sport returners had significantly higher self-esteem levels than those who did not return to sports, without observable differences in knee stability or time since surgery.

Further, in 2006, a study of 100 ACLR patients found that those who returned to sports had higher psychovitality and subjective outcome scores when compared to those who could not return to sports.^[22] This has been supported recently by a review of Medline database which concluded that psychological factors play an important role in return to play after ACLR.^[16]

As an orthopedic surgeon, it is a formidable task for us to identify the patients who are at risk for a poor surgical outcome which if done appropriately would allow us to refer to a sports psychologist. It is imperative to have a multidisciplinary approach for ACLR.

There are few constraints of this study which needs to be brought up, i.e., extreme male predominance (94.4%) in gender distribution and small sample size.

Conclusion

Evaluation of knee function using K-SES preoperatively is of predictive value for good functional outcome at 2 years after ACLR. We feel that a multidisciplinary approach is need of the hour so to have a greater patient satisfaction and improved functional outcomes.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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