Title: Differences in Knee Biomechanics Between Healthy, ACL-DF and ACL-RC Individuals During Four Common Sporting Tasks

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Background: Non-contact injury and re-injury to the anterior cruciate ligament (ACL) is a serious problem. Previous studies have investigated the differences in knee biomechanics between the ACL-injured, uninjured and controlled knees for both ACL-DF and ACL-RC populations separately. However, the differences in knee biomechanics between these three populations with involving both knees are of huge importance and still unclear.

Purpose: To investigate the differences in knee biomechanics during four common functional sporting tasks between healthy, ACL-DF and ACL-RC individuals with involving both limbs.

Study Design: Controlled laboratory study

Methods: Kinematic and kinetic data were obtained using 3D motion analysis and force platforms. 85 male participants (45 healthy, 20 unilateral ACL-DF and 20 unilateral ACL-RC performed four sporting tasks: running, cutting to 90 degrees, a single leg landing (SLL) and a single leg squat (SLS) with both limbs. Differences were assessed between groups.

Results: Both injured and uninjured knees in both ACL-RC and ACL-DF groups demonstrated a significantly lower peak knee extension moment as compared to healthy controls ($P \leq 0.004$) during cutting to 90 and SLL tasks. Additionally, that happed during running for the injured knee only. The injured knee also showed a lower peak knee flexion angle than the control group ($P \leq 0.004$) during running for ACL-RC, and during cut to 90 and SLL for ACL-DF. The uninjured limb in ACL-RC group showed greatest knee valgus moment between groups during SLL and cutting tasks and that was significant compared to the injured ACL-DF knee in both tasks ($P \leq 0.004$). Finally, both injured and uninjured knees in both ACL-RC and ACL-DF groups demonstrated a significantly lower vertical ground reaction force as compared to healthy controls ($P \leq 0.003$) during running, cutting to 90 and SLL.

Conclusions:
Despite that ACL-RC is widely considered as a gold standard for the treatment of ACL injury, the ACL-RC individuals still demonstrate the same common biomechanical deficits that the ACL-DF have in both injured and uninjured knees. Importantly, the uninjured knee in the ACL-RC group showed the greatest knee valgus moment between groups during SLL and cutting tasks.

Keywords: Anterior cruciate ligament, Reconstruction, Deficient, Biomechanics

Biography:
Dr. Abdullah Mohammed Alyami is an assistant professor in Sports Injuries Biomechanics, Physiotherapy Department, College of Applied Medical Sciences at Najran University, Najran city, Saudi Arabia. Presently, he has a private practice as a Physiotherapy Consultant and he works as an Assistant Professor in Sports Injuries Biomechanics. He graduated from the University of Salford, Manchester, UK with Doctor of Philosophy in Sport Injuries Rehabilitation and Biomechanics in 2020. He has published several articles in Rehabilitation Sciences.

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