

## **Analysis of Muscle Imbalance in Females who have Undergone ACL Reconstruction**

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### **ABSTRACT**

**BACKGROUND:** In recent years, research has highlighted the importance of inter-limb symmetry, highlighting associations between bilateral deficits in various physiological variables and heightened injury risk. Despite this emphasis, there is a noticeable gap in current literature regarding the assessment of lower limb musculature bilateral asymmetry in both healthy populations and those affected by anterior cruciate ligament reconstruction. **PURPOSE:** This study strived to compare lower limb musculature bilateral asymmetry in both healthy populations (CON) and those affected by anterior cruciate ligament reconstruction (ACLR) and to investigate potential imbalances that may persist after the completion of full physical therapy and receiving return-to-play clearance. **METHODS:** Twenty-three healthy females between 18-40 years of age participated in this study. Informed consent paperwork and anthropometric measurements were collected during session 1; sessions 2 and 3 each consisted of unilateral assessment of the lower extremities utilizing four protocols (MVC, ISO60, ISO180, Thorstensson) with a Biodex dynamometer. **RESULTS:** Statistical analyses revealed no significant differences in bilateral strength values within each group across the four protocols. Observed significant negative correlation values for ISO180 indicated that ACLR injury occurrence resulted in significantly lower relative quadriceps peak torque for right and left legs ( $r=-0.430$  and  $r=-0.481$ ,  $p<0.05$ , respectively). Agonist/antagonist ratio values for ISO180 showed trends for muscle imbalance between the quadriceps and hamstring muscles ( $p=0.055$ ). **DISCUSSION:** It should be noted that the weakness in right and left quadriceps in the ACLR group could be because of proportionate injury occurrence in right and left legs. No significant changes in ISO60 and significant changes in ISO180 suggest that the level of impact of ACL injury may be more pronounced in type I and IIa fibers. Therefore, therapy sessions may need to be revised and focus on improving these particular fiber types. Future studies should be conducted to determine which mechanism(s) from central to peripheral neuromuscular system of these fiber-selective effects.