

Loading response following anterior cruciate ligament reconstruction during the parallel squat exercise

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Abstract

Objective. To determine if individuals 1.5–15 months post-anterior cruciate ligament reconstruction demonstrated an equal loading response on their involved and uninvolved lower extremity during a parallel squat exercise versus a control group.

Design. Four-group repeated measures design with one between-subject factor (time post-anterior cruciate ligament reconstruction) and two within-subject factors (knee angle and added weight).

Background. It has been a clinical observation that post-anterior cruciate ligament reconstruction, individuals do not place equal amounts of weight upon each lower extremity during double-leg exercises.

Methods. Twenty-four subjects were in each of the experimental groups, 1.5–4 months, 6–7 months, and 12–15 months post-anterior cruciate ligament reconstruction, while 24 subjects without history of lower extremity pathology/injury served as the control group. PedarTM in-shoe sensors were placed inside the subjects' shoes to record loading response patterns during the exercises. All performed 3 sets of 9 randomized squats to each of the three knee flexion angles (30°, 60°, and 90°) with the three different weights (20.45 kg bar only, 35%, and 50% body mass) using a Smith squat rack TM. A three-way repeated measures ANOVA ($P < 0.050$) was used to compare the differences between groups in loading response statically between the uninvolved and involved lower extremity for each of the different weights at each knee flexion angle during the squat exercise.

Results. The three-way repeated measures ANOVA revealed that there was a significant group effect ($P < 0.001$). Thus, the amount of time post-anterior cruciate ligament reconstruction affected the difference in the subjects' loading response for the uninvolved and involved lower extremities. There was also a three-way interaction, indicating that the difference in loading response was dependent on the group, amount of knee flexion, and amount of added weight ($P = 0.010$).

Conclusion. These data suggest that subjects significantly load their uninvolved lower extremity until 12–15 months post-anterior cruciate ligament reconstruction.

Relevance

Based on the results of this study, caution may be warranted when adding resistance during the parallel squat for an individual's first year post-anterior cruciate ligament reconstruction, particularly with less knee flexion to avoid compensation and injury.