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ORIGINAL RESEARCH

COMPARISON OF CLINICAL FATIGUE PROTOCOLS TO DECREASE SINGLE-LEG FORWARD HOP PERFORMANCE IN HEALTHY INDIVIDUALS

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ABSTRACT

Background: Return to activity decisions after anterior cruciate ligament reconstruction (ACL-R) are limited by functional performance tests often performed in a non-fatigued state. Fatigue can improve test sensitivity, but current methods to induce fatigue are typically bilateral tasks or focus on the quadriceps muscle in isolation.

Hypothesis/Purpose: To determine the effects of a two-minute lateral step-down fatigue test compared to a 30-second side-hop test on single-leg forward hop distance in healthy individuals. It was hypothesized that participants would demonstrate decreased hop distance with both tests, but the two-minute lateral step-down fatigue test would result in greater deficits in single-leg forward hop distance.

Study Design: Randomized crossover

Methods: Twenty healthy participants (16 females, 4 males; age = 23.7 ± 3.0 years, height = 153.8 ± 36.2 cm; mass = 64.4 ± 12.8 kg; Tegner = 6.8 ± 1.2) were asked to perform single-leg forward hop for distance pre- and post-fatigue. Participants were randomly assigned to one of the two fatigue tests, 30-second side-hop or 2-minute lateral step-down test, during the first visit. They returned within a week and performed the same sequence of tests but underwent whichever fatigue test was not assigned at the prior visit.

Results: There was a significant decrease ($p < 0.001$) in single-leg forward hop distance following the 30-second side-hop test (pre = 134.1 ± 23.7 cm, post = 126.2 ± 24.4 cm) and the two-minute lateral step-down test (pre = 135.0 ± 26.1 cm, post = 122.7 ± 27.4 cm). The decrease in hop distance was significantly greater ($p < 0.001$) for the two-minute lateral step-down test compared to the 30-second side-hop test.

Conclusion: The two-minute lateral step-down test resulted in a greater decrease in hop performance compared to the 30-second side-hop test. The results establish a threshold for expected changes that occur in a healthy population and that can then be compared with an injured athlete population. The two-minute lateral step-down exercise may be an effective method of inducing fatigue to better mimic performance in a sports environment to inform return-to-sport decisions.

Level of Evidence: Level 1b- Therapy

Key Words: Anterior cruciate ligament reconstruction, fatigue, knee, rehabilitation, return to sport

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