

Effect of Carbohydrates on Landing Mechanics and Postural Stability During Intermittent High-Intensity Exercise to Fatigue

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Carbohydrate intake has demonstrated the ability to delay fatigue and improve performance during exercise, however its role on delaying neuromuscular risk factors for lower limb injuries linked to exercise and fatigue has not been studied.

PURPOSE: To evaluate the effect of a carbohydrate beverage (CHO) compared to a placebo (PLA) on landing kinematics, stability, and muscle activation patterns throughout an intermittent high-intensity exercise (IHE) protocol. **METHODS:** A total of 24 (12 male, 12 female) athletes (age: 23.0 ± 4.0 yrs; ht: 173.3 ± 7.1 cm; wt: 72.9 ± 11.5 kg; body fat: $18.0 \pm 6.4\%$) completed three days of testing. The first day of testing consisted of anthropometrics and familiarization with the IHE protocol. During the latter two testing sessions, participants performed four quarters of IHE while consuming either CHO or PLA during breaks between the quarters. Landing kinematics, muscle activation, and dynamic postural stability index (DPSI) scores were assessed immediately prior to starting the IHE protocol, at break three, and at break four. The DPSI scores were measured during a single-leg jump landing. Knee flexion and valgus/varus at initial contact, peak hip flexion, and surface electromyography pre-activity and re-activity of the hamstrings and quadriceps were measured during a single-leg stop-jump. Separate two-way repeated measures analyses of variance were performed to determine the interaction between time and treatment for landing kinematics and DPSI. Change in muscle activation was examined using a related samples Wilcoxon Signed Rank test. **RESULTS:** The CHO beverage had no effect on delaying changes in knee flexion at initial contact ($p = 0.472$), peak hip flexion ($p = 0.456$), and muscle activation ($p > 0.05$). A significant interaction effect occurred for DPSI scores ($p = 0.023$) and knee valgus/varus at initial contact ($p = 0.007$) however, these changes were small and may lack clinical significance. **CONCLUSION:** Subjects responded similarly to the IHE protocol regardless of treatment. Consuming a CHO beverage before, during, and after IHE had no effect on delaying neuromuscular/biomechanical changes resulting from IHE.

Supported by: Gatorade Sports Science Institute and The University of Pittsburgh School of Health and Rehabilitation Sciences Student Development Fund