Mid Atlantic Regional Chapter
of the
American College of Sports Medicine

46th Annual Scientific Meeting, November 3rd - 4th, 2023
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 12


# Changes in Loaded Carry Magnitude and its Effect on Stride Length, Cadence, and Muscle Activation

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The loaded carry is a movement pattern where an individual lifts and moves an implement a set distance. Due to their rigor and direct application, loaded carries have become a popular form of resistance training. Exercises like the farmers carry (FC), where the weight is held in both hands, have been shown to activate the core muscles across multiple planes of movement. However, we found little research on the implications of simple changes (i,e., load of implements) in altering the potential kinematics and neuromuscular effort of the FC. **PURPOSE:** To examine how changes in load alter stride length, cadence and muscle activation during the FC. **METHODS:** Healthy, college-aged individuals were recruited and their body composition (i.e., %fat, fat-free mass (FFM)) was measured. Each participant's FFM was used to calculate their FC loads. Standard surface electromyography (EMG) procedures were used to measure muscle activation of the rectus abdominis, external oblique, longissimus and multifidus during the FC. Maximal voluntary isometric contractions (MVIC) were completed and used to standardized muscle activation across subjects (% MVIC). Participants were fitted with inertial measurement units (IMUs) and videoed to capture joint kinematics. Randomized trials of 20-meter walks with no external load, 75% FFM, 100% FFM, and 125% FFM were recorded. A within-subject, repeated measures ANOVA was used to analyze differences in stride length, cadence, and EMG activity (% MIVC) and across load conditions. **RESULTS:** An increase in load was shown to reduce stride length (e.g., No weight- 140.4±2.8 v. 125% FFM- 122.4±2.1 cm; $P<0.05$), but increase the overall cadence (e.g., No weight- 107.1±1.6 v. 125% FFM- 115.0±2.1 steps/min; $P<0.05$) of the FC in our cohort. Further, an increase in implement load was associated with an increased % MVIC muscle activation across all examined muscles (e.g., external oblique: No Weight- 8.7±1.3, 75% FFM- 15.0±2.5, 100% FFM- 18.2±2.4, and 125% FFM- 23.8±2.6 %MVIC; $P<0.05$). **CONCLUSION:** Participants walked more rapidly when under an external load. In addition, as external load increased stride length decreased and muscle activation increased. **SIGNIFICANCE/NOVELTY:** Load selection for the FC can influence both exercise kinematics and muscle activation. These changes should be considered when designing a safe and effective resistance training program that includes the FC.