Physiological Responses of Thoracic Load Carriage During Walking in Men and Women
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Tactical occupations regularly require load carriage (LC). **PURPOSE:** To investigate the physiological responses of thoracic LC during walking between men and women. **METHODS:** Eight men (age: 21.0 ± 0.5yr; height: 180.1± 1.7cm; mass: 87.9 ± 4.5kg; body fat: 19.2 ± 2.5%) and eight women (age: 19.8 ± 0.3yr; height: 164.1 ± 2.5cm; mass: 64.0 ± 4.4kg; body fat: 23.5 ± 2.6%) participated in the study. On separate days, each subject completed four 10 min walking trials on a motorized treadmill at a predetermined unloaded intensity equal to 4 METs. Testing sessions included an unloaded (UL) trial, which served as the control, and wearing a light load (LL; 24lb = 10.9kg), moderate load (ML; 48lb = 21.8kg) and heavy load (HL; 80lb = 36.4kg) weighted vest. The testing order of the weighted vest trials was determined by counterbalanced assignment. Vest weights were selected to approximate common gear of tactical populations: law enforcement (LL), firefighter (ML), and military personnel (HL). Oxygen consumption (VO$_2$), heart rate (HR) and ratings of perceived exertion (RPE) were assessed during all trials. An average value from the last 2 min of exercise was calculated for VO$_2$, and HR for statistical analysis. Independent samples t-tests were used to compare variables. **RESULTS:** For all LC conditions, men had a higher absolute VO$_2$ (UL = 1.08 ± 0.13, LL = 1.18 ± 0.17, ML = 1.28 ± 0.19, HL = 1.45 ± 0.14 L·min$^{-1}$) than women (UL = 0.81 ± 0.14, LL = 0.85 ± 0.14, ML = 1.00 ± 0.17, HL = 1.20 ± 0.19 L·min$^{-1}$; p≤0.008). When normalized to body mass, only the HL condition showed a significant difference in relative VO$_2$ (men = 16.69 ± 1.88, women = 18.90 ± 1.94 ml·kg$^{-1}$·min$^{-1}$; p = .036). When expressed relative to fat free mass (FFM), significant differences occurred in the ML (men = 18.22 ± 2.43, women = 20.57 ± 1.53 ml·kgFFM$^{-1}$·min$^{-1}$; p = .036) and HL (men = 20.67 ± 1.88, women = 24.71 ± 1.35 ml·kgFFM$^{-1}$·min$^{-1}$; p≤0.001) conditions. A significantly higher HR was observed in women during ML (114 ± 13 bpm; p = .014) and HL (126 ± 4 bpm; p ≤ 0.001) compared to the men (ML: 97 ± 13 bpm, HL: 107 ± 11 bpm). RPE only differed between men (13.13 ± 3.27) and women (16.38 ± 1.77; p = .031) during the HL condition. **CONCLUSION:** During ML and HL, relative VO$_2$ in women exceeded men. Possible explanations include body composition and biomechanical differences. 

Supported by Lock Haven University’s Small Campus Grant