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### 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:  $21.0 \pm 0.5$ yr; height:  $180.1 \pm 1.7$ cm; mass:  $87.9 \pm 4.5$ kg; body fat:  $19.2 \pm 2.5\%$ ) and eight women (age:  $19.8 \pm 0.3$ yr; height:  $164.1 \pm 2.5$ cm; mass:  $64.0 \pm 4.4$ kg; body fat:  $23.5 \pm 2.6\%$ ) 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 =  $1.08 \pm 0.13$ , LL =  $1.18 \pm 0.17$ , ML =  $1.28 \pm 0.19$ , HL =  $1.45 \pm 0.14$  L·min<sup>-1</sup>) than women (UL =  $0.81 \pm 0.14$ , LL =  $0.85 \pm 0.14$ , ML =  $1.00 \pm 0.17$ , HL =  $1.20 \pm 0.19$  L·min<sup>-1</sup>;  $p \leq 0.008$ ). When normalized to body mass, only the HL condition showed a significant difference in relative  $VO_2$  (men =  $16.69 \pm 1.88$ , women =  $18.90 \pm 1.94$  ml·kg<sup>-1</sup>·min<sup>-1</sup>;  $p = .036$ ). When expressed relative to fat free mass (FFM), significant differences occurred in the ML (men =  $18.22 \pm 2.43$ , women =  $20.57 \pm 1.53$  ml·kgFFM<sup>-1</sup>·min<sup>-1</sup>;  $p = .036$ ) and HL (men =  $20.67 \pm 1.88$ , women =  $24.71 \pm 1.35$  ml·kgFFM<sup>-1</sup>·min<sup>-1</sup>;  $p \leq 0.001$ ) conditions. A significantly higher HR was observed in women during ML ( $114 \pm 13$  bpm;  $p = .014$ ) and HL ( $126 \pm 4$  bpm;  $p \leq 0.001$ ) compared to the men (ML:  $97 \pm 13$  bpm, HL:  $107 \pm 11$  bpm). RPE only differed between men ( $13.13 \pm 3.27$ ) and women ( $16.38 \pm 1.77$ ;  $p = .031$ ) during the HL condition. **CONCLUSION:** During ML and HL, relative  $VO_2$  in women exceeded men. Possible explanations include body composition and biomechanical differences.

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