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### The Cardiopulmonary Effects of Thoracic Load Carriage While Resting

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**PURPOSE:** To investigate the cardiopulmonary effects of thoracic load carriage (LC) while sitting and standing. **METHODS:** Eight males and one female (Age:  $21.0 \pm 1.4$  yr; Height:  $178.9 \pm 5.8$  cm; Weight:  $86.1 \pm 13.2$  kg; Body Fat:  $20.2 \pm 7.2\%$ ) without LC experience participated in the study. On separate days, subjects completed four trials of sitting quietly for 5 minutes, and then standing quietly for 5 minutes without assistance. 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). Minute ventilation ( $V_e$ ), respiratory rate (RR), Tidal volume ( $T_v$ ), oxygen consumption ( $VO_2$ ), heart rate, and ratings of perceived exertion (RPE) were assessed during all trials. An average value from the last minute was calculated for  $V_e$ , RR,  $T_v$ ,  $VO_2$ , and heart rate and used in a repeated measures ANOVA for statistical comparison. **RESULTS:** While sitting, there were no differences observed across trials in any of the aforementioned variables. While standing,  $V_e$  was significantly higher during ML ( $p = .013$ ) and HL ( $p = .005$ ) compared to unloaded (UL =  $12.6 \pm 3.2$ , LL =  $12.2 \pm 1.9$ , ML =  $14.8 \pm 3.7$ , HL =  $14.9 \pm 4.1$  l·min<sup>-1</sup>). RR,  $T_v$  and heart rate were not different during any of the standing trials. Relative  $VO_2$  while standing was significantly higher for ML ( $p = 0.038$ ) and HL ( $p = 0.001$ ) compared to UL (UL =  $4.3 \pm 0.6$ , LL =  $4.6 \pm 0.6$ , ML =  $5.0 \pm 0.7$ , HL =  $5.3 \pm 0.8$  ml·kg<sup>-1</sup>·min<sup>-1</sup>). Standing RPE was significantly higher for ML ( $p = 0.050$ ) and HL ( $p = 0.014$ ), compared to UL (UL =  $6.1 \pm 0.3$ , LL =  $6.9 \pm 1.6$ , ML =  $7.6 \pm 1.9$ , HL =  $7.9 \pm 1.7$ ). **CONCLUSION:** Sitting while under thoracic load carriage did not elicit any significant changes. While standing, ML and HL elicited an increase in  $V_e$ , although it is unclear if this response was due to RR,  $T_v$ , or a combination of both. ML and HL increased oxygen consumption by 16% and 23% respectively while standing, as well as increased the perceived effort.

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