

INTERACTION OF MILITARY LOAD CARRIAGE AND FATIGUE ON POSTURAL SWAY IN YOUNG, HEALTHY SUBJECTS

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INTRODUCTION: Lower extremity musculoskeletal injury is one of the most common injuries in the US Armed Forces. Decreased postural stability has been shown to be a risk factor for lower extremity musculoskeletal injury. Load carriage and fatigue have been demonstrated respectively to decrease postural stability.[1, 2] However, the combined effect of military load carriage and fatigue has yet to be investigated. The purpose of the study was to investigate the effect of military load carriage and fatigue due to an exhaustive march on postural stability. This study may provide guidelines for preventing loss of postural stability when carrying military load and under fatigued state. **METHODS:** This study utilized a two-way repeated measures descriptive study design. Eighteen healthy, physically active male and female subjects (22 ± 2.47 yrs, 171 ± 9.30 cm, 71 ± 10.91 kg) participated. Subjects reported for two test sessions, with one session studying the effect of fatigue without military load carriage and the other studying the effect of fatigue with military load carriage. The order of test sessions was counterbalanced across subjects. Postural stability was assessed pre-fatigue and post-fatigue during each session. Subjects carried a load of 30% of body mass during the loaded condition. The load consisted of a helmet, body armor vest with additional weights attached via pouches, and a non-operational rifle. The fatigue protocol included a set of lifting tasks followed by marching on a treadmill until volitional fatigue. Postural stability was measured with the subjects standing with two feet on one force platform, keeping their eyes open, and holding the rifle across their chest with both hands. The outcome measurement includes total excursion for the center of pressure path in the anterior-posterior (COPLX) and the medial-lateral (COPLY) directions (cm), and the resultant planar motion (COPLR) (cm). Two-way repeated measures analyses of variance were conducted to test for fatigue and military load carriage effects. **RESULTS:** Military load carriage significantly increased COPLY and COPLR (9.89 ± 1.97 cm vs. 8.08 ± 1.39 cm; 12.42 ± 2.36 cm vs. 10.98 ± 1.84 cm; $p = 0.04$ and $p < 0.01$), but not COPLX. Fatigue significantly increased COPLY and COPLR (9.50 ± 2.00 cm vs. 8.47 ± 1.72 cm; 12.25 ± 2.41 cm vs. 11.14 ± 2.10 cm; $p < 0.01$ and $p = 0.03$), but not COPLX. There was a significant interaction effect between fatigue and military load carriage on COPLX ($p = 0.03$) but not COPLY and COPLR. Military load carriage resulted in less COPLX post-fatigue ($p = 0.02$). **DISCUSSION:** Military load carriage and fatigue increased medial-lateral and resultant postural sway, and may increase risks of injury. Military load carriage may mitigate the effect of fatigue in the anterior-posterior direction. Future study should investigate the mechanism of the interaction between military load carriage and fatigue in anterior-posterior direction. **REFERENCE:** 1.Pendergrass TL, Moore JH, Gerber JP. Postural control after a 2-mile run. *Mil Med.* Nov 2003;168(11):896-903. 2.Schiffman JM, Benseck CK, Hasselquist L, Gregorczyk KN, Piscitelle L. Effects of carried weight on random motion and traditional measures of postural sway. *Appl Ergon.* Sep 2006;37(5):607-614.



Postural stability assessment with military load carriage.