Abstract

Thesis: The Effects of a Simulated Ruck March on Joint Mechanics and Postural Stability in Untrained Personnel

Student: Brian Fox

Degree: Master of Science

College: Health

Date: July 2020

Pages: 66

Military personnel (Warfighters) are frequently exposed to heavy load carriage as a result of their job, with all personnel carrying at least 31kg (68.2lbs) of equipment as a standard fighting load. Carrying posteriorly-based heavy loads like these will cause changes to joint mechanics while walking to compensate for the additional weight. While trained Warfighters may have adapted mechanisms to properly compensate for these changes, incoming recruits may react differently, potentially increasing their risk for injury. This study observed the static and dynamic postural stability and joint mechanics of persons untrained in load carriage before and after a simulated ruck march. The simulated ruck march consisted of 20 minutes of walking at 1.34m/s while wearing a 25kg rucksack on the back. Postural stability was assessed before and after the march, and joint mechanics were assessed before and after the march, as well as in loaded compared to unloaded conditions. Researchers observed that neither static nor dynamic postural stability was affected by the simulated ruck march. Stride length decreased and cadence increased, both as a result of load (p=.035; p=.049, respectively). Left and right hip angles were more extended at heel strike (p=.004; p=.007) and toe off (p=.008; p=.009) while loaded compared to unloaded, left and right knees were more flexed at heel strike while loaded (p=.003;
p=.042), and left ankle angles were more dorsiflexed at heel strike while loaded (p=.044). Participants underwent significantly more trunk flexion while loaded compared to being unloaded (p<.001). Vertical ground reaction forces were higher as a result of the march compared to pre-march (p=.013). This data suggests that persons with no load carriage experience prefer a shorter stride length to compensate for the load, but still observe higher ground reaction forces.