

The Effects of Heavy Backpack Carriage on Hand Strength

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ABSTRACT

Force production in upper limb muscles could be affected following exercise that involves carrying a heavy backpack load. In lower limb muscles, previous study has demonstrated that there is muscle force depression after several different regimens of metabolically and mechanically demanding exercise. **PURPOSE:** The aim of this study is to examine pinch strength after exercising while carrying a heavy backpack with straps that compress the nerves and blood vessels of the upper limb. We hypothesized that backpack load carriage at 15% body weight and 30% body weight will lead to changes in upper limb lateral pinch strength as compared to a no-load condition. **METHODS:** To date, eleven participants (5 female, 6 male; mean \pm SD of 25.8 \pm 6.3 yrs, 81.9 \pm 18 kg mass, 11 right handed) have completed 3 load conditions on separate days: 1) no backpack, 2) 15% body weight (BW) backpack, and 3) 30% BW backpack. Load condition order was randomized. Maximum lateral pinch strength was measured bilaterally using a pinch dynamometer before and after participants walked on a treadmill at 1.1 m/s for 30 minutes for each load condition. Pinch strength was measured every 5 minutes for 30 minutes after exercise. RMANOVA with Bonferroni post-hoc testing was used to compare among backpack conditions and among timepoints. **RESULTS:** Mean pinch strength on the dominant hand before backpack carriage was 10.8 \pm 2.7 kg for male participants and 8.0 \pm 1.2 kg for female participants. Pinch strength on the non-dominant hand before load carriage averaged 9.9 \pm 1.7 kg for male participants and 7.5 \pm 1.0 kg for female participants. Mean pinch strength on the dominant hand after 30% BW backpack carriage ranged from 10.6-10.9 kg for male participants and from 7.8 - 8.3 kg for female participants. There were no significant differences in pinch strength on either hand when comparing among backpack load conditions or timepoints for male or female participants. **CONCLUSION:** The compression of backpack straps and the exercise of walking with a backpack load did not affect pinch strength in the first 30 minutes after backpack carriage.