Isometric handgrip exercise improves acute neurocardiac regulation.

Millar PJ, MacDonald MJ, Bray SR, McCartney N.

Abstract

Isometric handgrip (IHG) training (>6 weeks) has been shown to reduce resting arterial blood pressure (ABP) and improve cardiac autonomic modulation. However, the effects of a single bout of IHG on acute neurocardiac regulation remain unknown. The purpose of this study was to examine the effect of IHG exercise on nonlinear heart rate dynamics and cardiac vagal activity. Nonlinear dynamics were assessed by sample entropy, detrended fluctuation analysis (alpha(1)), and correlation dimension techniques. The 4-second exercise test was used to calculate the cardiac vagal index (CVI), an indirect measure of cardiac vagal activity. In a randomized crossover design, 18 older (70 +/- 5 years of age) subjects completed IHG exercise (four 2-min isometric contractions at 30% MVC) and a time-matched control condition. Following a single bout of bilateral IHG, there was a small reduction in systolic blood pressure (125 +/- 2 to 122 +/- 1 mmHg, P < 0.01), in addition to, a significant decrease in alpha(1) (1.42 +/- 0.12 to 1.22 +/- 0.10, P < 0.05), an increase in sample entropy (1.28 +/- 0.03 to 1.40 +/- 0.05, P < 0.001), and an increase in the CVI (1.24 +/- 0.03 to 1.29 +/- 0.03, P < 0.01). These results suggest improvements in acute cardiac autonomic modulation following a single bout of IHG. This may be mechanistically linked to the observed reductions in ABP seen in previous IHG training studies. Alternatively, these acute effects may have clinical applications and require further investigation.

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