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Comparative Analysis of a Bout of Isometric Hand Grip Exercise using a Traditional (Computerized) or Mechanical Handgrip

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Isometric handgrip (IHG) training lowers resting blood pressure (BP), but the high cost of traditional computerized IHG devices can be a barrier to use. Inexpensive mechanical IHG devices could address the cost barrier, but the acute stimulus of such devices must be determined. This study compared changes in systolic and diastolic BP, heart rate (HR), muscular activation, ratings of perceived exertion (RPE), and pain between a computerized and a mechanical IHG device during an IHG bout. Twenty healthy adults ($X \pm SD$; Age: 22.4 ± 2.2 yrs.; $\text{♀} = 9$; BP: $114/64 \pm 11/7$ mmHg) randomly performed an IHG bout (4, 2-min IHG contractions at 30% of maximum voluntary contraction, separated by 4-min rest) on each device. BP, HR, and forearm surface EMG data of the non-dominant arm were collected throughout. RPE and pain were acquired at the end of each contraction.

SBP, HR, RPE and NRS-Pain scores did not differ between devices ($p > 0.05$). However, statistically significant differences in DBP were observed ($p < 0.05$), whereby the computerized device elicited a higher DBP response than did the mechanical device. Furthermore, significant elevations in muscular activation for only the biceps brachii and extensor carpi ulnaris were observed in the mechanical handgrip device ($p < 0.05$).

The mechanical IHG induced similar acute SBP, HR, RPE and NRS-pain scores as well as similar muscular activation for 3 of the 5 muscles tested as the traditional computerized device. These findings suggest that perhaps this inexpensive alternative device could be a feasible equivalent to the traditional computerized device during acute exercise. Future studies should examine whether this inexpensive handgrip device can elicit similar training-induced reductions in resting BP as with the traditional computerized devices.