

Responses to an isometric leg-exercise test predicts sex-specific training-induced reductions in resting blood pressure after isometric leg training.

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Introduction

Isometric training, using either isometric handgrip (IHG) or isometric bilateral-leg (IBL) protocols, is an effective method of lowering resting systolic blood pressure (SBP_{rest}). However, the reductions in SBP_{rest} seen after training vary widely between individuals. Predicting likely training-induced reductions in SBP_{rest} could make it possible to optimise the effects of the training in all participants. It is known that post-IHG training reductions in SBP_{rest} can be predicted by SBP responses to a 2 minute IHG task in both hypertensive and older normotensives (Millar et al., 2009; Badrov et al., 2013). However, the predictability of such a test in younger individuals and when using a comparable IBL task, has not been established. Furthermore, it is not known whether these simple isometric tests can predict reductions in ambulatory SBP (mean 24-hour, SBP_{amb}) as well as SBP_{rest} . Therefore, the purpose of this study was to determine whether an IBL test can be used to predict training-induced reductions in SBP_{rest} and SBP_{amb} following 10 weeks of IBL training in young men and women.

Methods

Resting and ambulatory BP (SBP_{rest} and SBP_{amb}) were measured prior to and following 10 weeks of IBL training using an isokinetic dynamometer (4, 2-minute contractions at 20% MVC with 2 minute rest periods, 3/week) in 20 normotensive individuals (10 men, age=21 ± 4 years; 10 women, age=23 ± 5 years). SBP responses to the IBL test (single 2-minute period of IBL exercise) was derived by calculating the difference between peak SBP and mean baseline SBP_{rest} . Pearson's product moment correlation coefficient was used to assess the relationship between the blood pressure responses to a short 2-minute IBL test and the magnitude of the reductions in SBP_{rest} and SBP_{amb} after IBL training.

Results

There were significant reductions in men and women's SBP_{rest} (7.4 ± 5.1 mmHg, $p=0.0001$ & 5.7 ± 4.1 mmHg, $p=0.001$) and SBP_{amb} (4.0 ± 1.9 mmHg, $p=0.011$ & 6.1 ± 5.8 mmHg, $p=0.0001$) following training. These changes in SBP_{rest} were strongly correlated with pre-training SBP response to the IBL test in both men ($r=-0.83$, $p=0.003$, $SEE=3.03$) and women ($r = -0.81$, $p=0.004$, $SEE=2.56$). However, the magnitude of the reductions in SBP_{amb} were not correlated with SBP response to the IBL test (men, $r=-0.44$, $p=0.199$, $SEE=1.76$; women, $r=-0.23$, $p=0.517$, $SEE=6.01$).

Discussion

These results support previous research which has identified that IBL training is an effective tool for lowering both resting and ambulatory BP. Furthermore, a simple isometric exercise test can be used as a tool to predict reductions in resting SBP, but not ambulatory SBP, after IBL training in both men and women. This test could be used to optimise the effects of this type of training in a wider range of participants, perhaps through modification of the training, to suit the anticipated effects in different individuals.

Badrov BM, Horton S, Millar PJ, McGowan CL. (2013). *Psychophysiol.* 50(4), 407-414