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EDITORIAL

Continuous Aerobic and High-Intensity Interval Exercise: Which one Produces greater Post-Exercise Hypotension?

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Exercise training is a key recommendation for maintenance of a healthy life style. It is well established that regular physical exercise provides innumerous physiological and psychological benefits not only to young healthy subjects, but also individuals with diabetes, heart failure, Parkinson disease, multiple sclerosis, claudication, autonomic failure, hypertension, among others. A well-documented physiological response to exercise is called post-exercise hypotension (PEH), in which a single bout of exercise leads to a decrease in arterial blood pressure. The first study showing PEH was published in 1898 by Dr. L. Hill.[1] Thereafter, several authors confirmed these results showing that a single bout of exercise can reduce arterial blood pressure below pre-exercise values. However, one question that remains to be answered is which exercise modality produces greater PEH?

Previous studies have shown that continuous aerobic (CONT) exercise, high-intensity interval (HIIE) training, isometric exercise and resistance-based exercise can lead to a PEH.[2] Studies comparing CONT and HIIE showed that the magnitude of PEH was slightly superior following HIIE compared with CONT exercise.[3,4] However, in these studies, the exercise protocols were not matched by volume. This is important because longer exercise duration and higher-intensity exercise results in greater decreases in arterial blood pressure and longer PEH duration when compared with a short bout of low-intensity exercise.[5,6]

Keywords

Blood Pressure; Exercise Therapy; Hypertension/diagnosis; Hypertension/physiopathology; Hypertension/therapy, Physical Endurance; Time Factors; Treatment Outcome.

It is in this context that Boeno and colleagues,[7] in the current issue of the International Journal of Cardiovascular Sciences, take an important step forward in comparing CONT and HIIE in terms of the magnitude of PEH. The authors aimed to evaluate PEH following a single bout of CONT or HIIE running adjusted by equivalent volumes in healthy subjects. In a randomized cross-over design, thirteen young, sedentary and normotensive men were exposed to either CONT or HIIE treadmill running. Participants performed exercise until the completion of 5 km in CONT (at 70% of maximal heart rate previously obtained during maximal cardiopulmonary exercise test) or HIIE training (1-min running at 90% followed by 1-min at 60% maximum heart rate). Hemodynamic variables (heart rate and arterial blood pressure) were measured at rest, immediately after and 60-min following exercise (every 5-min of recovery). The main finding of the study was that both CONT and HIIE, matched by volume, promoted PEH in a similar magnitude. However, the onset of PEH was slightly different between exercise modalities. Indeed, PEH started 15-min following HIIE and remained throughout the 60-minute period, whereas PEH was initiated at the 30th minute following CONT running and remained throughout the testing period. Overall, Boeno et al.[7] provide exciting results on the effects of different running exercise modalities (i.e., CONT vs. HIIE) on acute blood pressure reduction following exercise.

The underlying mechanisms of PEH are not fully understood, but compelling evidence suggests that the central baroreflex pathway plays a key role in the development of PEH.[3,4] The arterial baroreflex represents a closed-loop, negative feedback control system involved in the regulation of arterial blood pressure. Mechanically-sensitive receptors located in the carotid

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body and aortic arch relay information to the brainstem regarding beat-to-beat changes in blood pressure.[8] In healthy individuals, arterial baroreflex remains functional during exercise by resetting to operate around the prevailing pressure elicited by exercise. However, some evidence suggests that arterial baroreflex function is impaired in hypertensive subjects and normalized by exercise training.[9] In this sense, although the work of Boeno et al.[7] suggests that PEH was similar between CONT and HIIE matched by volume, these results was observed in young sedentary normotensive men, limiting its extrapolation to other populations. Indeed, although PEH occurs in normotensive and hypertensive individuals, its occurrence is more prominent in hypertensive individuals.[10]

In conclusion, Boeno and colleagues should be commended for their approach equalizing exercise volume to examine PEH in response to CONT and HIIE. They demonstrated for the first time that exercise volume plays a critical role on the magnitude of PEH when comparing CONT and HIIE in young healthy subjects. We now await further studies examining the magnitude of PEH comparing CONT and HIIE matched by volume in older individuals and patients with hypertension to definitively answer that, if adjusted by equivalent volumes, both CONT and HIIE produce similar PEH.

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