

Respiratory Pump Contributions to Hemodynamic Responses in Lower-Body Negative Pressure: Preliminary Results

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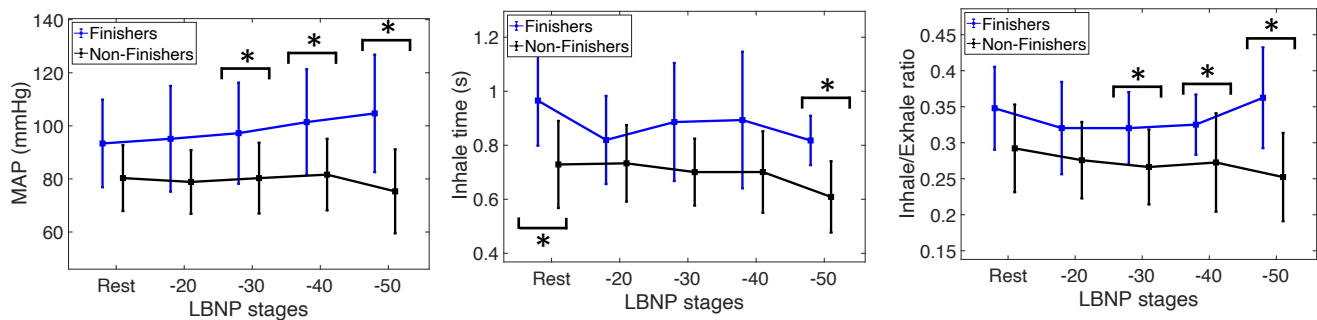
Objective

The purpose of this study is to investigate the effect of respiration on blood pressure during Lower-Body Negative Pressure (LBNP).

Methods

Simultaneous blood pressure (BP), electrocardiogram, and respiration were recorded from 19 participants (age: 28 ± 6 years; height: 170 ± 7 cm; weight: 68 ± 10 kg). The lower body of each participant was placed in the LBNP chamber and sealed at the level of the iliac crest. The participants lay supine inside the chamber for 5 minutes before the pressure was gradually reduced to -20 mmHg. From there, the pressure was gradually reduced in 10 mmHg steps to -60 mmHg. Participants who showed presyncopal signs before the pressure in the chamber reached -60 mmHg were classified as non-finishers (12 participants) while the ones who completed the experiment without any presyncope symptoms were considered finishers (7 participants).

Results



Preliminary results showed that the non-finishers had lower mean arterial pressure at -30 mmHg, -40 mmHg and -50 mmHg compared to the finishers. The finishers had longer inhale times at rest and at -50 mmHg compared to the non-finishers. Moreover, the non-finishers had a reduced inhale/exhale ratio at -30 mmHg, -40 mmHg and -50 mmHg compared to the finishers.

Conclusions

Our data suggests that the elevation of inhale time in the finishers group results in an effective respiratory pump response to central hypovolemia induced by LBNP. An increased inhale time contributes to a larger decline of intrathoracic pressure, which allows more blood to flow into the right heart increasing cardiac filling, and venous return. These findings may be useful in clinical decision-making to prevent hemorrhage progression.