Sex differences in The Hemodynamic Response to arm elevation

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The force of gravity affects blood pressure (BP) by influencing intravascular pressure gradients. Men and women have a different BP response to challenges that alter pressure gradients such as orthostatic challenge. **Purpose:** We examined the peripheral hemodynamic response to arm elevation as a means of studying potential sex differences in gravity-induced changes in BP. **Methods:** Radial artery waveforms were obtained using applanation tonometry in 20 men (age 27±2 yrs, BMI 25±1 kg/m2) and 20 women (age 27±2 yrs, BMI 23±1 kg/m2). Arm position was maintained at either heart level or supported 14 cm above heart level in a randomized fashion. Amplitude of the late systolic shoulder (P2) of the radial BP wave was used as a measure of pressure attributable to wave reflections. A reservoir-wave separation technique was used to obtain the arterial reservoir pressure (pressure generated by arterial capacitance discharge). **Results:** Women showed a significant reduction in diastolic blood pressure (DBP) (69±2 to 66±1 mmHg; $p<0.05$) and reservoir pressure (16.8±1.2 to 14.2±1.2 mmHg; $p<0.05$), with no change in P2 (26.9±1.3 to 26.0±1.4 mmHg; $p>0.05$) during arm elevation. Conversely, men showed no change in DBP (70±2 to 69±1 mmHg, $p>0.05$) while showing a significant increase in reservoir pressure (11.9±1.3 to 14.5±1.2 mmHg; $p<0.05$) and P2 (25.3±1.3 to 28.7±1.4 mmHg, $p<0.05$) during arm elevation. **Conclusion:** Gender differences exist in the hemodynamic response to gravity-induced changes in regional BP. In response to arm elevation, men maintain DBP possibly via increased pressure from wave reflections and reservoir pressure. Women experience a drop in DBP and this may be due to reductions in reservoir pressure coupled with inability to increase pressure from wave reflections.

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