

Fractionized Exercise Lowers Morning Central Blood Pressure Under Conditions of Recommended and Long Sleep Durations

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ABSTRACT

Long sleep duration (9+ hours) is gaining attention as a parameter that may increase the risk for cardiovascular disease with reports of habitually long duration sleepers having higher nighttime blood pressure (BP), higher day-to-day BP variability, and pulse pressure (PP). **PURPOSE:** The aims of the study were to determine the effect of one week of long duration sleep on central BP, and examine the impact of fractionized exercise on central BP under controlled sleep duration conditions. **METHODS:** Eleven participants (46± 5 years; 9 women) spent six nights with 8 or 10+ hours in bed to achieve recommended (7-8 hours) and long sleep durations as measured using a wrist-worn accelerometer (GT9x, Actigraph). On the sixth day, fractionized exercise consisted of three 10-minute bouts of brisk walking at a set cadence to reach an intensity of 60-75% age-predicted maximum heart rate. Central BP was measured the morning before and after fractionized exercise using applanation tonometry of the right radial artery (SphygmoCor PVx, AtCor Medical). Pulse wave analysis yielded other important indices including forward and reflected pressure waves along with pulse wave velocity (PWV). Two-way repeated-measures analyses of variance with factors of sleep duration (recommended vs. long) and time (pre- vs. post-exercise) were used to assess for differences in central BP. **RESULTS:** Sleep duration was significantly different between the 8 and 10+ hours in bed protocols (426 ± 19 vs. 550 ± 18 minutes, $p < 0.001$). Long duration sleep did not alter central BP or pulse wave pressures as compared to the recommended sleep duration ($p > 0.05$). A main effect for time was observed for central PP such that PP was significantly reduced following fractionized exercise as compared to baseline (29 ± 2 vs. 27 ± 2 mmHg, $p = 0.04$). The lower central PP was accompanied by reduced reflected wave pressure (14 ± 1 vs. 13 ± 1 mmHg, $p < 0.01$), reflection magnitude (72 ± 4% vs. 65 ± 4%, $p = 0.01$), and PWV (7.5 ± 0.2 vs. 7.2 ± 0.2 m/s, $p = 0.01$). **CONCLUSION:** One week of long duration sleep does not alter central BP in middle-aged adults, but fractionized exercise is effective at reducing central PP under conditions of recommended and long sleep durations.

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