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Effect of oral contraceptive pill phase on carotid body chemosensitivity

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Objective: Patients with sleep apnea experience periods of low oxygen (hypoxia) during sleep. The carotid body (CB) chemoreflex stimulates an increase in breathing during hypoxia (hypoxic ventilatory response, HVR). Sleep apnea is more prevalent in men than women, possibly due to sex differences in CB chemosensitivity; however, mechanisms remain unclear. We sought to examine the impact of sex hormones on CB chemosensitivity to hypoxia. We hypothesized the HVR would be greater in the active pill phase of oral contraceptive use compared to the placebo pill phase.

Methods: Women taking oral hormonal contraceptives (n=10) completed 2 visits (placebo, active) in random order. During each study visit, women were instrumented for measures of heart rate, blood pressure, and minute ventilation. Women completed an HVR test on both visits, consisting of a 2-min normoxic baseline, followed by 4-5 acute exposures to hypoxia. The HVR was assessed as the slope of the relationship between arterial oxygen saturation (SpO2, %) and minute ventilation (L/min).

Results: Plasma ethinylestradiol was 57 ± 34 pg/mL during the placebo pill and 110 ± 42 pg/mL during the active pill phase of oral contraceptive use (p=0.21). The hypoxic ventilatory (-0.28 to -0.25 L/min/%, p=0.47), heart rate (-0.96 to -0.79 beats/min/%, p=0.34), and blood pressure response (-0.42 to -0.40 mmHg/%, p=0.84) to hypoxia did not differ between placebo and active pill, respectively.

Conclusions: Contrary to our hypothesis, the HVR did not differ between active and placebo pill phases of oral contraceptive use. These data suggest there is no observable effect of changes in exogenous female sex hormones on CB chemosensitivity in healthy young women.

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