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Similar Carotid Pulsatility with Oral Contraceptive Use During Low- and High-Hormone Menstrual Cycle Phases

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INTRODUCTION: Approximately 65% of women ages 15-49 in the United States use birth control, with approximately 14% of women choosing oral contraceptives (OCPs) as their preferred method. However, the impact of OCPs on the vasculature across the menstrual cycle has been debatable, in part due to changes in formulation. Previous studies suggest central stiffness and macrovascular function are similar across low and high-hormone phases of the menstrual cycle, although the potential impact of OCPs on local carotid pulsatility is understudied. Understanding the potential impact of OCPs on local carotid pulsatility is important due to its association with cognitive diseases/overall brain health. **PURPOSE:** To evaluate the effect of OCPs on local carotid pulsatility. **METHODS:** Carotid ultrasound was performed on six women taking oral contraceptives (OCP; 23 ± 4 y) and on five naturally menstruating women (NAT; 22 ± 3 y) during the low-hormone (follicular) and high-hormone (luteal) phases of the menstrual cycle. Carotid measurements included pulsatility index (PI), forward-traveling compression wave (W1), backward-traveling compression wave (NA), and reflection index (RIx; ratio of NA:W1). **RESULTS:** There were no significant interaction between OCP use and menstrual cycle phase for PI [(OCP, low hormone: 4.97 ± 1.59 A.U., high hormone: 5.14 ± 1.05 A.U.; NAT, low hormone: 5.19 ± 0.77 A.U., high hormone: 4.35 ± 0.95 A.U.), ($F(1,9) = 1.363$, $p=0.27$)], W1 [(OCP, low hormone: 7.35 ± 2.54 mmHg/m/s^3, high hormone: 8.77 ± 2.68 mmHg/m/s^3; NAT, low hormone: 5.23 ± 1.37 mmHg/m/s^3, high hormone: 5.78 ± 1.37 mmHg/m/s^3), ($F(1,8) = 0.2938$, $p=0.060$)], NA [(OCP, low hormone: 37.92 ± 23.52 mmHg/m/s^2, high hormone: 47.25 ± 16.22 mmHg/m/s^2; NAT, low hormone: 28.77 ± 9.04 mmHg/m/s^2, high hormone: 33.86 ± 17.76 mmHg/m/s^2), ($F(1, 9) = 0.16$, $p=0.69$)], nor RIx [(OCP, low hormone: 4.96 ± 2.08 A.U., high hormone: 5.65 ± 2.26 A.U.; NAT, low hormone: 6.39 ± 1.35 A.U., high hormone: 5.81 ± 2.50 A.U.), ($F(1,8) = 1.142$, $p= 0.32$)]. **CONCLUSION:** Carotid pulsatility is similar between women taking OCPs and naturally menstruating women during both low hormone and high hormone phases of the menstrual cycle. **SIGNIFICANCE/NOVELTY:** This study indicates women taking OCPs may not be at a higher risk for cognitive disease, as measured by carotid pulsatility. This is important due to the influence of extracranial vessels, such as the carotid artery, on intracranial hemodynamics and therefore brain health. Older women are at an increased risk for dementia, therefore, understanding the potential impact of OCP use on brain health is crucial as millions of premenopausal women take OCP as their preferred method of birth control.

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