TACSM Abstract

Effects of Menstrual Cycle Phase on Cold Pressor Test Responses

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ABSTRACT

Previous research has demonstrated women in the luteal phase have a greater time to pain threshold with similar cardiovascular responses during a cold pressor test (CPT), however, not all studies have confirmed these findings. **PURPOSE**: The purpose of this study was to test the hypothesis that during a CPT, perceived pain will be lower in females in the luteal phase, with no difference in the accompanying cardiovascular or autonomic responses to that CPT between menstrual cycle phases. **METHODS**: Thirty healthy women, 15 in the follicular phase of the menstrual cycle (age: 27 ± 5 yrs, body mass: 73 ± 9 kg, body mass index: 25 ± 3 kg/m^2, heart rate: 65 ± 12 bpm, systolic blood pressure: 115 ± 8 mmHg, days since onset of menses: 6 ± 4) and 15 in the luteal phase (age: 26 ± 5, body mass: 75 ± 7 kg, body mass index: 27 ± 3 kg/m^2, heart rate: 69 ± 9 bpm, systolic blood pressure: 121 ± 11 mmHg, days since onset of menses: 23 ± 4) participated in this study. Menstrual cycle status was self reported. Participants were instrumented for continuous measurement of beat-to-beat blood pressure (BP) (photoplethysmography: Finometer), heart rate (electrocardiogram), and muscle sympathetic nerve activity (MSNA: microneurography of the radial nerve). Data were collected during a 10 minute baseline followed by a two minute CPT. Pain perception (a 100-mm visual analog score (VAS)) and the change in heart rate, BP, and MSNA were compared between menstrual cycle phases using unpaired t-test or Mann Whitney U Test, when appropriate. **RESULTS**: There was no difference in perceived pain between phases (follicular: 65.3 ± 19.6 mm vs. luteal: 60.9 ± 20.6 mm, p=0.560). Increases in mean BP from baseline to the end of the CPT were not different between the phases (follicular: 13 ± 9 vs. luteal: 18 ± 12 mmHg, p=0.141), nor were increases in heart rate (follicular: 9 ± 11 bpm, luteal: 10 ± 10 bpm, p= 0.513). The increase in burst frequency (follicular: 8.32 ± 7.74 bursts/min vs. luteal: 12.67 ± 7.75 bursts/min, p= 0.164) and burst incidence (follicular: 8.66 ± 13.16 bursts/100 beats vs. luteal: 15.20 ± 14.14 bursts/100 beats, p= 0.426) from baseline to the end of the CPT were not different between the phases. However, MSNA during the first 30 seconds of the CPT was profoundly different between phases. Generally, participants in the follicular phase had an increase, whereas participants in the luteal phase had a decrease in both burst frequency (follicular: 9.91 ± 6.35 bursts/min vs. luteal: -1.24 ± 4.79 bursts/min, p=0.007) and bursts incidence (follicular: 9.96 ± 5.21 bursts/100 beats vs. luteal: -6.02 ± 4.72 bursts/100 beats, p<0.001). **CONCLUSION**: These findings demonstrate no differences in pain perception or cardiovascular autonomic responses to the CPT between phases of the menstrual cycle. However, the initial MSNA response to the CPT was greatly affected by menstrual cycle phase. Mechanisms for the difference in neural responses at the onset of a painful stimulus between menstrual cycle phases should be further explored.