

Impact of Menstrual Cycle on Resting and Postprandial Metabolism in Recreationally Active, Eumenorrheic Females

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ABSTRACT

Changes in estrogen and progesterone across the menstrual cycle impact many biological systems including resting and postprandial metabolism. **PURPOSE:** To investigate whether menstrual cycle phase impacted resting and postprandial energy expenditure (EE) and substrate utilization in recreationally active, eumenorrheic females. **METHODS:** In this study, 8 eumenorrheic females (mean±SD age: 33±8 years, BMI: 22.5±2.2 kg/m²; VO_{2max}: 36.9±3.8 ml/kg/min) had resting energy expenditure (REE) and substrate utilization continuously measured with indirect calorimetry for 45 min at rest after an overnight fast, and for 3 h after a mixed meal (490 kcal, 53% carbohydrate, 31% fat, 20% protein) during three distinct phases of the menstrual cycle (early follicular, late follicular, and mid luteal). Menstrual cycle phase was determined using calendar-based counting, ovulation test strips, and confirmed via serum hormone levels (estrogen and progesterone). REE (kcal/day) was calculated using the abbreviated Weir Equation. Diet-induced thermogenesis (DIT) was calculated by subtracting REE (kcal/min) from postprandial EE (kcal/min). This value (kcal/min) was then multiplied by the testing time (180 min) to obtain DIT (kcal) for the 3-h postprandial period. A one-way, repeated measures ANOVA was used to assess differences in REE, respiratory quotient (RQ), and DIT across menstrual cycle phase. All data reported as mean±SD. **RESULTS:** REE was higher during mid luteal (1486±178 kcal/day) compared to early follicular (1409±108 kcal/day) and late follicular (1390±103 kcal/day) phases (F[2,14]=2.28, p=0.14; effect size=0.25). Resting RQ did not differ across menstrual cycle phase. DIT was higher during early follicular (34±8 kcal) and late follicular (32±12 kcal) than mid-luteal (23±12 kcal) phase (F[2,14]=3.02, p=0.08; effect size=0.30). Postprandial RQ was higher during early follicular (0.87±0.04) and late follicular (0.87±0.03) than mid-luteal (0.85±0.04) phase (F[2,14]=3.22, p=0.07; effect size=0.32). **CONCLUSION:** These preliminary results on 8 recreationally active, eumenorrheic females suggest that resting and postprandial metabolism may differ across the menstrual cycle. It is unclear whether the magnitude of these differences is clinically meaningful.