Abstract

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Serum Antioxidants Are Associated with Serum Reproductive Hormones and Ovulation among Healthy Women.


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BACKGROUND: Evidence is growing that the equilibrium between reactive oxygen species and antioxidants plays a vital role in women's reproductive health.

OBJECTIVE: The objective of this study was to evaluate variations in serum antioxidant concentrations across the menstrual cycle and associations between antioxidants and reproductive hormones and anovulation among healthy women.

METHODS: The BioCycle Study, a prospective cohort, followed 259 women aged 18-44 y for up to 2 menstrual cycles. Serum fat-soluble vitamin and micronutrient (α-tocopherol, γ-tocopherol, retinol, lutein, lycopene, and β-carotene), ascorbic acid, and reproductive hormone concentrations were measured 5-8 times/cycle. We used weighted linear mixed models to assess associations between antioxidants and hormone concentrations, after adjustment for age, race, body mass index, parity, sleep, pain medication use, total energy intake, concurrent hormones, serum cholesterol, F2-isoprostanes, and other antioxidants. Generalized linear models were used to identify associations with anovulation.

RESULTS: Serum antioxidant concentrations varied across the menstrual cycle. Retinol and α-tocopherol were associated with higher estradiol [RR: 1.00 pg/mL (95% CI: 0.67, 1.34 pg/mL); RR: 0.02 pg/mL (95% CI: 0.003, 0.03 pg/mL), respectively] and testosterone [RR: 0.61 ng/dL (95% CI: 0.44, 0.78 ng/dL); RR: 0.01 ng/dL (95% CI: 0.001, 0.01 ng/dL), respectively]. Ascorbic acid was associated with higher progesterone (RR: 0.15 ng/mL; 95% CI: 0.05, 0.25 ng/mL) and with lower follicle-stimulating hormone (RR: -0.06 mIU/mL; 95% CI: -0.09, -0.03 mIU/mL). The ratio of α- to γ-tocopherol was associated with an increased risk of anovulation (RR: 1.03; 95% CI: 1.01, 1.06).

CONCLUSIONS: These findings shed new light on the intricate associations between serum antioxidants and endogenous hormones in healthy premenopausal women and support the hypothesis that concentrations of serum vitamins affect steroidogenesis even after adjustment for oxidative stress.

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