Child Health Research Institute

University of Nebraska Medical Center

Children's Hospital & Medical Center

Assessing carotenoid intake in pregnant women based on adequacy of dietary vitamin A intake

Anum Akbar, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198
Matthew C VanOrmer, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198
Melissa Thoene, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198
Rebecca Slotkowski, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198
Taija M Hahka, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198
Corrine Hanson, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, 68198
Ann Anderson-Berry, Department of Pediatrics, University of Nebraska Medical Center, Omaha, NE 68198

Vitamin A is an essential nutrient during pregnancy responsible for a variety of functions, including cell differentiation, proliferation, and organ development in the fetus. Over 19 million pregnant women worldwide suffer from Vitamin A deficiency (VAD) during pregnancy. Dietary preformed Vitamin A (retinol and retinyl ester) and pro-vitamin A carotenoids (α-carotene, β-carotene and β-cryptoxanthin) remain the main source of vitamin A for pregnant women. Non-provitamin A carotenoids (lycopene and lutein) also have important protective effects, acting as potent antioxidants in tissues such as the macular region of retina; however, the role of these carotenoids during pregnancy has not been established. To investigate the intake levels of pro-vitamin carotenoids (α-carotene, β-carotene, and β-cryptoxanthin) and non-provitamin carotenoids (lycopene and lutein) in pregnant women with adequate dietary vitamin A intake vs. those with inadequate vitamin A intake. An IRB-approved study enrolled 496 pregnant women at delivery and assessed their gestational dietary intake using the Harvard Food Frequency Questionnaire. Vitamin A intake was measured via Retinol Activity Equivalents (RAE, mcg/day), with adequacy defined as 770 mcg/day. Daily intake of pro-vitamin A carotenoids and non-pro-vitamin A carotenoids were compared between mothers with adequate RAE intake vs deficient RAE intake using the Mann-Whitney U test, and a p-value of <0.05 was considered statistically significant. The average RAE intake of all participants was 1747 mcg/day with daily intake of pro-vitamin A carotenoids as follows: α-carotene 233 mcg/day, β-carotene 5504 mcg/day and β-cryptoxanthin 113 mcg/day. Moreover, intake levels of non-provitamin carotenoids were observed as follows: lycopene 4551 mcg/day and lutein 2531 mcg/day. Women with adequate RAE intake showed approximately two-fold higher intake (5500 vs 2200 mcg/day; p-value <0.05) of pro-vitamin A carotenoids (α-carotene, β-carotene and β-cryptoxanthin) compared to women with deficient RAE intake. Interestingly, concentration of non-pro-vitamin A carotenoid (lutein) was also found to be two-fold higher (2530 vs 1300 mcg/day: p-value <0.05) in women with adequate RAE intake than in women with inadequate RAE intake. Approximately 1/3rd of our pregnant study participants showed inadequate RAE intake. Our data indicates that intake of non-pro-vitamin A carotenoid (such as lutein) differ based on adequate RAE intake, suggesting an opportunity for nutritional interventions during pregnancy. There is a need of future studies to better understand the impact of these carotenoids on both maternal and neonatal pregnancy outcomes.