Abstract


Exploring the concept of functional vitamin D deficiency in pregnancy: impact of the interaction between 25-hydroxyvitamin D and parathyroid hormone on perinatal outcomes.

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BACKGROUND: Associations of vitamin D with perinatal outcomes are inconsistent and few studies have considered the wider calcium metabolic system.

OBJECTIVES: We aimed to explore functional vitamin D deficiency in pregnancy by investigating associations between vitamin D status, parathyroid hormone (PTH), and perinatal outcomes.

DESIGN: SCOPE (Screening for Pregnancy Endpoints) Ireland is a prospective cohort study of low-risk, nulliparous pregnant women. We measured serum 25-hydroxyvitamin D [25(OH)D] and PTH at 15 wk of gestation in 1754 participants.

RESULTS: Mean ± SD 25(OH)D was 56.6 ± 25.8 nmol/L (22.7 ± 10.3 ng/mL) and geometric mean (95% CI) PTH was 7.84 pg/mL (7.7, 8.0 pg/mL) [0.86 pmol/L (0.85, 0.88 pmol/L)]. PTH was elevated in 34.3% of women who had 25(OH)D <30 nmol/L and in 13.9% of those with 25(OH)D ≥75 nmol/L. Whereas 17% had 25(OH)D <30 nmol/L, 5.5% had functional vitamin D deficiency, defined as 25(OH)D <30 nmol/L with elevated PTH. Elevated mean arterial pressure (MAP), gestational hypertension, pre-eclampsia, and small-for-gestational-age (SGA) birth were confirmed in 9.2%, 11.9%, 3.8%, and 10.6% of participants, respectively. In fully adjusted regression models, neither low 25(OH)D nor elevated PTH alone increased the risk of any individual outcome. The prevalence of elevated MAP (19.1% compared with 9.7%) and SGA (16.0% compared with 6.7%) were highest (P < 0.05) in those with functional vitamin D deficiency compared with the reference group [25(OH)D ≥75 nmol/L and normal PTH]. The adjusted prevalence ratio (PR) and RR (95% CIs) for elevated MAP and SGA were 1.83 (1.02, 3.27) and 1.53 (0.80, 2.93), respectively. There was no effect of functional vitamin D deficiency on the risk of gestational hypertension (adjusted RR: 1.00; 95% CI: 0.60, 1.67) or pre-eclampsia (adjusted RR: 1.17; 95% CI: 0.32, 4.20).

CONCLUSION: The concept of functional vitamin D deficiency, reflecting calcium metabolic stress, should be considered in studies of vitamin D in pregnancy. The SCOPE pregnancy cohort is registered at http://www.anzctr.org.au as ACTRN12607000551493.

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