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Interactions between vitamin D status, calcium intake and parathyroid hormone concentrations in healthy pregnant women

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Emerging evidence highlights the potential of the vitamin D and calcium metabolic system to impact pregnancy outcomes and adverse effects of vitamin D-parathyroid hormone (PTH) interactions on perinatal health have been reported^(1,2). PTH concentrations reflect homeostasis in the calcium metabolic system, and can be impacted by calcium intake as well as circulating 25-hydroxyvitamin D [25(OH)D] concentrations, reflecting vitamin D status. Little explored in pregnancy, we aimed to examine the relative importance of vitamin D status and calcium intake on PTH concentrations among healthy pregnant women.

This was a cross-sectional analysis of 142 white-skinned participants of mean (SD) 14 (2) weeks’ gestation at baseline of a dose-response randomised controlled trial of vitamin D [NCT02506439]⁽³⁾. Serum 25(OH)D was measured by a CDC-accredited LC-MS/MS method and calcium intakes were estimated using a validated quantitative food frequency questionnaire⁽⁴⁾. Serum albumin-corrected calcium and intact PTH were measured by colorimetric assay (Randox Laboratories Ltd.) and ELISA (MD Biosciences Inc.), respectively. Serum 25(OH)D was stratified at 50 nmol/L and calcium intakes by < 800, 800–1000 and ≥ 1000 mg/day according to the Institute of Medicine⁽⁵⁾. After log transformation of PTH, we used Pearson’s correlations and two-way ANOVA to explore effects of calcium intakes and 25(OH)D on PTH.

Geometric mean (95% CI) PTH concentration was 9.24 (8.37, 10.19) pg/mL. Mean (SD) 25(OH)D and calcium intake were 54.9 (22.6) nmol/L and 1182.5 (485.8) mg/day, respectively. 44% of participants had a 25(OH)D < 50 nmol/L and calcium intake was < 800 and ≥ 1000 mg/day in 22% and 63%, respectively. PTH was inversely correlated with vitamin D status ($r = -0.311$, $P < 0.01$), but not calcium intake ($r = -0.087$) or serum calcium ($r = 0.057$). There was no evidence of an interaction between calcium intake and 25(OH)D on PTH concentration ($P = 0.941$). There was a statistically significant main effect of serum 25(OH)D ($P = 0.025$) but not calcium intake ($P = 0.822$) on PTH.

To conclude, in this group of healthy pregnant women with largely sufficient calcium intake, vitamin D status, but not calcium intake was important for maintaining calcium homeostasis.

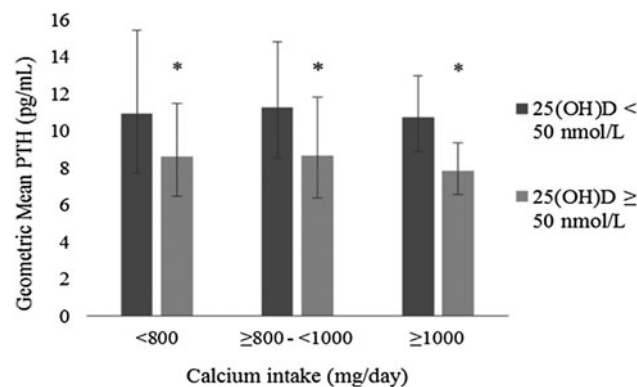


Fig. 1. PTH concentrations in 142 pregnant women stratified by vitamin D status and calcium intake. PTH values are geometric mean (95% CI). * denotes $P < 0.05$

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