

Bone resorption and calcium in pregnancy – A window to future maternal bone health

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Pregnancy is characterised by increased bone turnover and reversible loss of bone mineral density (BMD) to meet fetal calcium demands⁽¹⁾. The long-term effect of bone turnover and maternal diet in pregnancy on maternal bone is unclear in Western populations⁽²⁾. We aimed to determine the association between bone resorption, diet, and lifestyle behaviours in pregnancy and 5-year BMD.

This is a longitudinal study of 107 women originally recruited to the ROLO study⁽³⁾ at 13 weeks' gestation and followed-up to 5 years later. In pregnancy we measured urine cross-linked N-telopeptides of type I collagen (uNTX), a biomarker of bone resorption. At the 5-year follow-up we measured BMD using dual-energy X-ray absorptiometry. Anthropometry, dietary calcium and serum 25-hydroxyvitamin D (25OHD) were measured at both time points. We used multiple linear regression controlling for confounders to determine the associations between maternal characteristics and BMD.

Mean BMD at the 5-year follow-up was 1.208 g/cm². At 13 and 28 weeks' gestation, median uNTX concentrations were 68.8 and 107.24 nM BCE/mmol Cre, respectively. Mean dietary calcium intakes were 999–1051 mg/day in pregnancy and 1136 mg/day at the 5-year follow-up. Vitamin D deficiency (<30 nmol/L) was observed in 38–41% of women in pregnancy and in 29% of women at the 5-year follow-up. Variables associated with maternal BMD at the 5-year follow-up using multiple linear regression models are displayed in the table below.

	B	P	95% CI	Model P
Early pregnancy uNTX ≥68.80	−0.060	0.002	(−0.097, −0.023)	<0.001
Late pregnancy uNTX ≥107.24	−0.050	0.016	(−0.091, −0.010)	<0.001
5-year follow-up 25OHD <30 nmol/L	−0.066	0.014	(−0.119, −0.014)	0.006
Calcium <800 mg/day, Trimester 3 ^a	−0.072	0.002	(−0.117, −0.027)	<0.001

All models controlled for: maternal age at 5-year DXA; weight at 5-year DXA; energy (kcal/day) at 5 years; calcium (mg/day) at 5 years; alcohol (g/day) at 5 years; grouping (intervention); parity (≥3 children); years since last pregnancy (>2 years). ^aExcluded confounder: calcium (mg/day) at 5 years.

Higher bone resorption and low dietary calcium in pregnancy, as well as vitamin D deficiency at the 5-year visit were associated with lower BMD 5 years later. These novel findings could allow health care professionals to identify women at risk of declining of BMD in later life, but further research is needed. Adequate dietary calcium in pregnancy should be advised in the antenatal setting for the promotion of lifelong maternal bone health.

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3. Walsh JM, McGowan CA, Mahony R *et al.* (2012) *BMJ* **345**, e5605.