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Effect of vitamin D supplementation on vitamin D status in pregnant women: findings from the MO-VITD study

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Abstract

Pregnant women who are overweight/obese are particularly vulnerable to vitamin D insufficiency owing to higher physiological requirements and lower status (25(OH)D concentrations) associated with obesity. Achieving adequate maternal vitamin D status with current recommendations (10µg/d) remains controversial.

This study examined supplementation effects (10µg-vs-20µg vitamin D₃/d) throughout pregnancy (12 weeks gestation until delivery) on vitamin D status of normal weight, overweight and obese pregnant women and on cord blood, using a double-blind randomised vitamin D intervention study (MO-VITD). 240 pregnant women were recruited throughout the year at antenatal clinics in Northern Ireland (equal numbers of normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obese (> 30kg/m²)). Non-fasting maternal blood samples were collected at 12, 28 and 34–36 weeks gestation and from the umbilical cord after delivery and analysed for total serum 25(OH)D using LCMS.

A high prevalence of vitamin D insufficiency (25–50nmol/L) was found in the 1st trimester in both treatment groups (41.5% and 48.8%; 10µg vs. 20µg respectively). Maternal 25(OH)D concentrations increased from the 1st to 3rd trimester in both the 10µg/d and 20µg/d groups, with a higher increase in the 20µg group (17.1 ± 24.7 and 28.8 ± 33.3nmol/L, *P* = 0.002). There was no difference in cord blood 25(OH)D concentrations between treatment groups.

Women who started pregnancy with insufficient 25(OH)D concentrations remained insufficient throughout pregnancy in the 10µg/d group (49.9 ± 28.2nmol/L at trimester 3). In the 20µg/d group, women starting pregnancy as insufficient achieved levels of sufficiency in the 2nd (58.9 ± 30.6nmol/L) and 3rd (64.0 ± 35.9nmol/L) trimesters. Women who started pregnancy with sufficient vitamin D status (25(OH)D > 50nmol/L), maintained levels of sufficiency throughout pregnancy irrespective of treatment group (83.1 ± 24.4 and 96.7 ± 30.7 at trimester 3 in 10µg/d and 20 µg/d groups respectively); findings were similar across all BMI categories.

Obese women who started pregnancy with an insufficient status were found to have deficient cord blood (25(OH)D < 25 nmol/L) in both the 10µg/d and 20µg/d groups (19.4 ± 20.2 vs. 19.5 ± 9.4nmol/L respectively), whilst obese women who started pregnancy with sufficient status (> 50nmol/L) had cord blood concentrations considered insufficient (40.2 ± 18.4 vs. 44.2 ± 15.6nmol/L; 10µg vs. 20µg groups respectively).

Based on our findings of the high prevalence of vitamin D insufficiency in early pregnancy, maternal vitamin D supplementation of 20µg/d is advisable to maintain maternal vitamin D status in pregnant women in Northern Ireland.

Conflict of Interest

There is no conflict of interest