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The association between maternal body weight and vitamin D status in early pregnancy: findings from the MO-VITD study

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Abstract

Maternal BMI has been shown to be inversely correlated with vitamin D status (25-hydroxyvitamin D (25(OH)D) concentrations) during pregnancy. Pregnant women with obesity and with vitamin D deficiency are at risk of many adverse health outcomes in pregnancy.

The aim of this study was to examine differences in maternal vitamin D status across normal weight, overweight and obese pregnant women in early pregnancy.

Data collected at baseline from a double-blind randomised vitamin D intervention study (MO-VITD) were used. Pregnant women without pregnancy complications, aged > 18 years and having a singleton pregnancy were recruited between January 2016 and August 2017 at antenatal clinics in the Western Health and Social Care Trust, Northern Ireland. Non-fasting blood samples were collected at 12 weeks gestation and analysed for total serum 25(OH)D, using liquid chromatography tandem mass spectrometry. Data from 239 pregnant women (80 normal weight, 79 overweight, 80 obese) were included in the current analysis.

The mean \pm SD 25(OH)D concentration of all pregnant women at 12 weeks gestation was 52.0 ± 21.6 nmol/L. Women classed as obese or overweight had significantly lower 25(OH)D concentrations compared to women of normal weight (48.8 ± 20.3 vs 49.8 ± 20.4 vs. 57.5 ± 23.1 nmol/L, $P = 0.019$; obese, overweight, normal weight respectively). A total of 45% of all pregnant women were found to be either vitamin D deficient (25(OH)D < 25nmol/L; 13%) or insufficient (25–50 nmol/L; 32%) in early pregnancy. BMI was significantly negatively correlated with 25(OH)D concentrations ($r = -0.168$; $P = 0.009$). Regression analyses showed that BMI ($\beta = -0.165$; $P = 0.006$), season ($\beta = 0.220$; $P < 0.0001$), supplement use ($\beta = -0.268$; $P < 0.0001$) and a sun holiday within the previous 6 months ($\beta = -0.180$; $P = 0.010$) were significant predictors of 25(OH)D concentrations. In early pregnancy, 62% of pregnant women reported using a supplement containing vitamin D and 38% reported no supplement use. Supplement users had a significantly higher vitamin D status than non-supplement users in all BMI categories but overall, 37% of supplement users were still classified as vitamin D insufficient. Vitamin D status was significantly lower in winter months compared to summer months. In early pregnancy, especially during winter months, pregnant women with obesity, particularly non-supplement users, are at higher risk of low vitamin D status. Based on the lower vitamin D status observed in early pregnancy in obese women, the effect of BMI on vitamin D supplementation throughout pregnancy needs to be examined.

Conflict of Interest

There is no conflict of interest