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## Maternal choline status during pregnancy, but not that of betaine, is related to antenatal mental well-being: the GUSTO cohort

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Choline and betaine status have previously been associated with depression symptoms. No studies to date have examined the influence of maternal choline and betaine status during pregnancy on antenatal and postnatal mental well-being, yet this may be important as pregnant women have a higher dietary choline requirement to meet the needs of the growing fetus<sup>(1)</sup>.

Maternal plasma choline and betaine concentrations ( $\mu\text{mol/L}$ ) were measured at 26–28 weeks gestation in the GUSTO mother-offspring cohort. Participants filled out the State-Trait Anxiety Inventory (STAI) and Edinburgh Postnatal Depression Scale (EDPS) at 26–28 weeks gestation ( $n = 949$ ) and at 3 months postnatal ( $n = 689$ ), where higher scores were indicative of more depression and anxiety symptoms. Multivariate linear regression models were used to estimate the association of choline and betaine with ante- and postnatal mental well-being, adjusting for covariates.

The mean (SD) antenatal plasma choline and betaine concentrations were 9.2 (1.6)  $\mu\text{mol/L}$  and 13.1 (2.7)  $\mu\text{mol/L}$ , respectively. Plasma choline concentrations were positively associated with antenatal depression [ $\beta$  0.24 EPDS score (95% CI 0.05, 0.43) per  $\mu\text{mol/L}$ ] and anxiety scores [ $\beta$  0.46 STAI-state score (95% CI 0.03, 0.88) per  $\mu\text{mol/L}$ ], upon adjusting for covariates. Plasma betaine concentrations were not associated with antenatal depression or anxiety. No associations were observed between choline, betaine, and postnatal mental well-being.

This study is the first to report that higher maternal plasma choline status is associated with more symptoms of antenatal depression and anxiety, while plasma betaine concentrations showed no associations. No associations were observed for postnatal mental well-being. Prospective studies are required to replicate these findings and further examine the direction of causality and possible biological mechanisms. This study is part of a series of work examining maternal nutrition and mental well-being in the GUSTO study<sup>(2,3)</sup>.

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