Cord 25-hydroxy-vitamin D is not associated with cranial anthropometrics in infants

• Sissil Egge[1] • Nikolas Chrisensen[1,2] • Sine Lykkedegn[1,2] • Tina Kold Jensen[2,3] • Henrik Thybo Christesen[1,2]
[1] Hans Christian Andersen Children's Hospital, Odense University Hospital, University of Southern Denmark, 5000 Odense C, Denmark
[2] Department of Clinical Research, University of Southern Denmark, Winsløwparken 19, 3. Sal, 5000 Odense C, Denmark
[3] Department of Environmental medicine, J. B. Winsløws Vej 17, 2. sal. 5000 Odense C, Denmark

Aim

To investigate the impact of cord 25-hydroxyvitamin D (25OHD) levels on cranial anthropometrics in infants.

Introduction

Vitamin D deficiency can cause rickets and impaired bone growth in infants. Randomization to higher vitamin D doses in pregnancy has been shown to decrease anterior fontanelle size and increase the head circumference (1). However, the impact of vitamin D on the intramembranous ossification of the flat bones of the skull is controversial.

Materials and methods

- Inclusions: Infants from Odense Child Cohort, a prospective cohort of 2549 mother/children pairs. 1773 infants were included. Median (IQR) age at examination was 3.70 (2.50-5.93) months.

- Outcomes: Anterior fontanel was measured in mm using a *ArcRoyal* ruler, fontanel area was calculated by transverse and longitudinal diameters. Head circumference was measured in cm using *SECA* measuring tape. Head shape was visually inspected by trained staff.

- Exposure: Blood samples were drawn for $25OHD_{2+3}$ analysis from cord blood, as well as from early (GA <20 weeks) and late pregnancy (GA ≥20 weeks). Analysis was performed using liquid chromatography mass spectrometry.

- Exclusions: Multiple births, gestational age <34 weeks, unavailable cord 25OHD and missing measures of cranial anthropometrics.

- Statistics: Multiple linear, quantile and logistic regressions to test the association between 25OHD and cranial anthropometrics.

Results

Table 1. Outcome variables by child sex.

		Mean			
	n (% boys)	All	Boys	Girls	*p-value**
Fontanel area	*765 (54%)*				
Continuous, mm²**		225	220	232.5	0.779
SD-score		0.28	0.32	0.24	0.160
Head circumference	*1776 (52%)*				
Continuous, cm		41.48	42.08	40.81	**<0.001**
SD-score		0.19	0.24	0.14	**0.015**
Head shape, %	*1527 (53%)*				
Percent asymmetric		55 %	60 %	50 %	**<0.001**

*Parametric data: t-test; non-parametric data: Mann–Whitney U test; binominal data: Chi²-test. p-values in bold are < 0.05 and was considered significant with 95 % CI.
**Median was used instead of mean. SD-score: Standard deviation score.
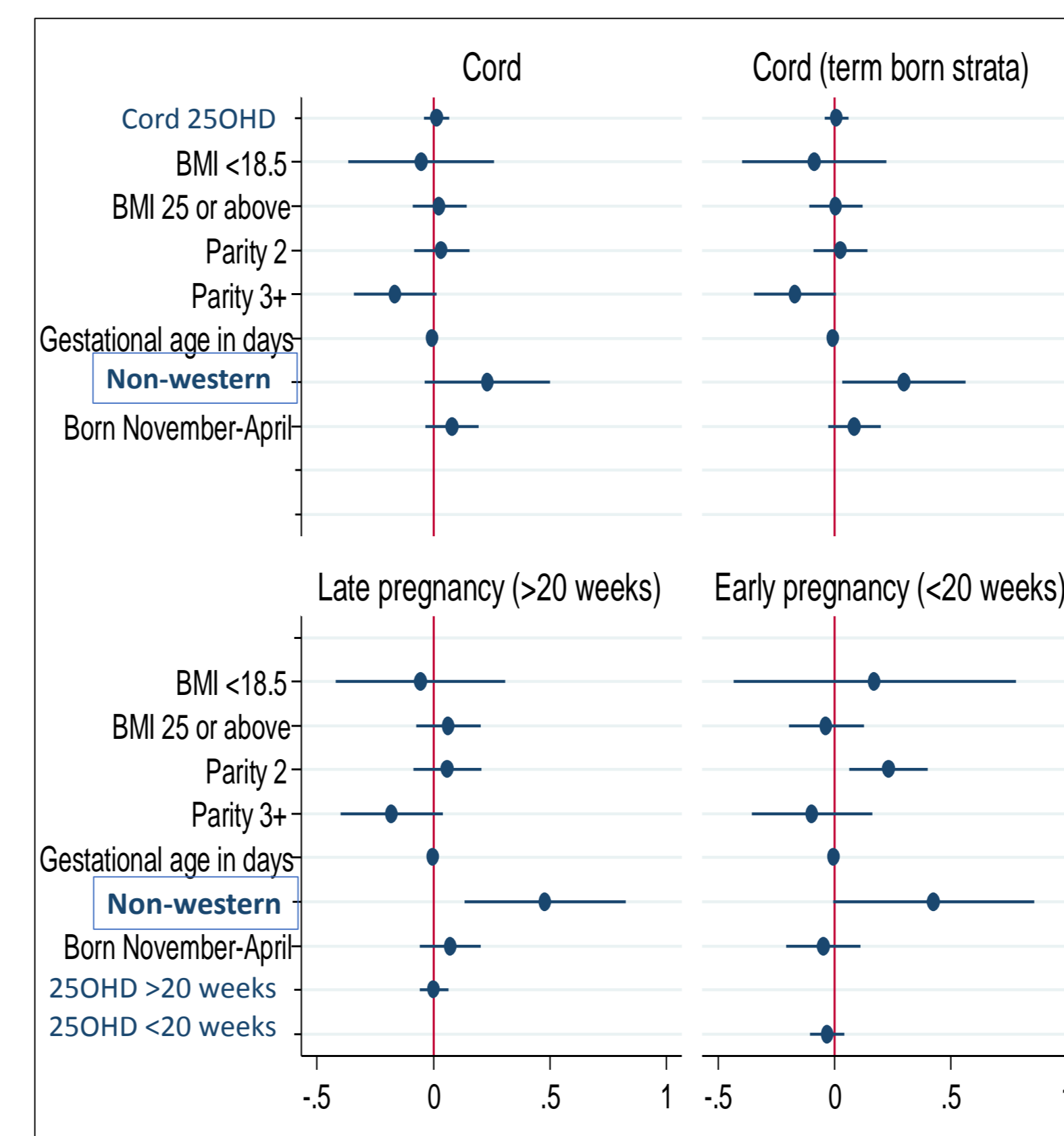
Reference:
1. Kalra P, Das V, Agarwal A, Kumar M, Ramesh V, Bhatia E, et al. Effect of vitamin D supplementation during pregnancy on neonatal mineral homeostasis and anthropometry of the newborn and infant. The British journal of nutrition. 2012;108(6):1052-8.

Results

Mean (SD) early, late pregnancy and cord 25OHD were 65.97 (21.33), 78.60 (27.18) and 47 (21.66) nmol/L respectively. Mean (SD) fontanel area and median (IQR) head circumference were 225 (1578) mm² and 41.48 (1.46) cm respectively. 55% had asymmetric head shape (Table 1).

Figure 1: Adjusted associations of 25OHD with fontanel area SD-score and head circumference SD-score at 3.7 months follow up, β (95 % CI). 25OHD in blue. Consistent associations with outcomes are marked in bold blue and outline.
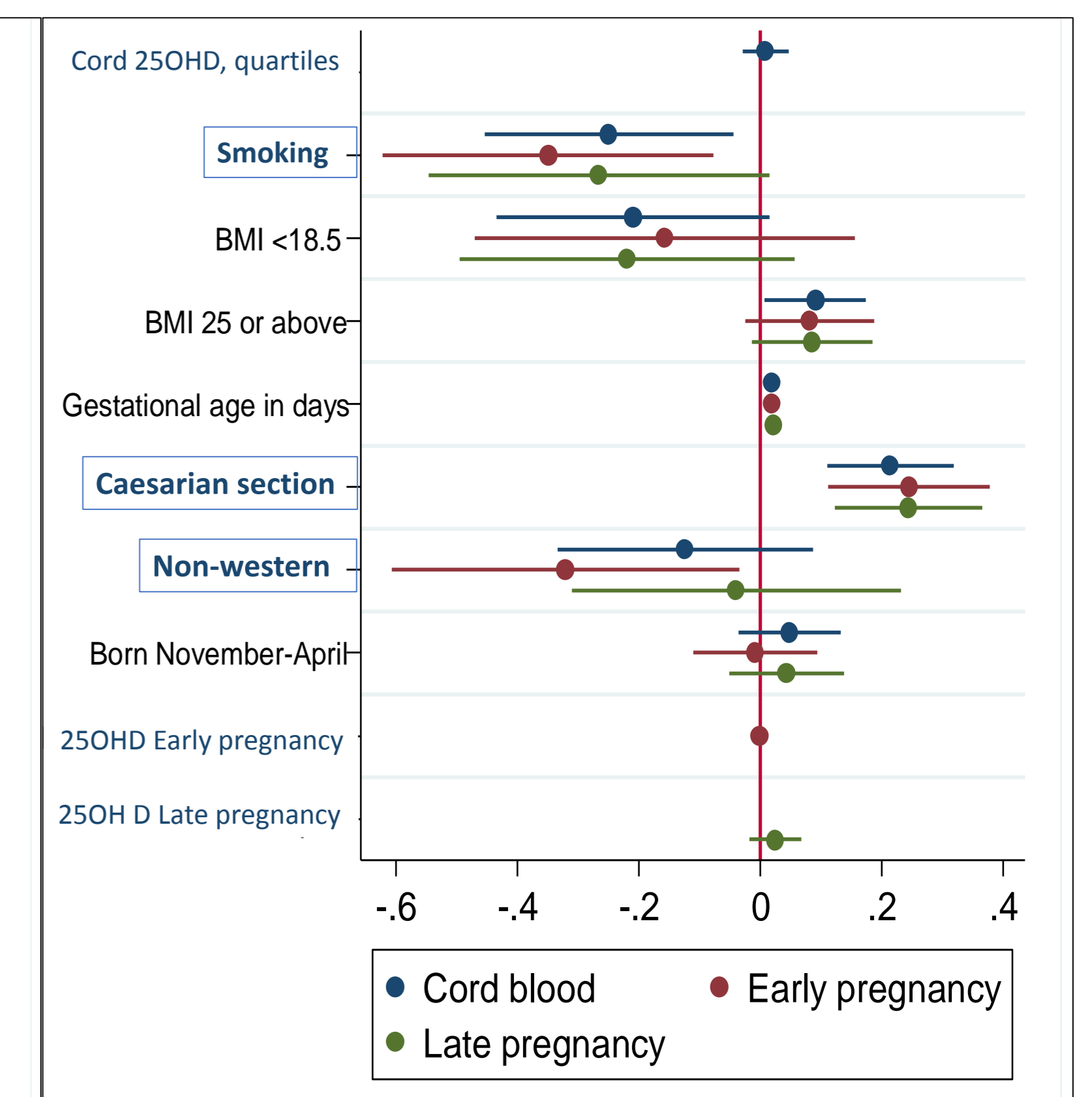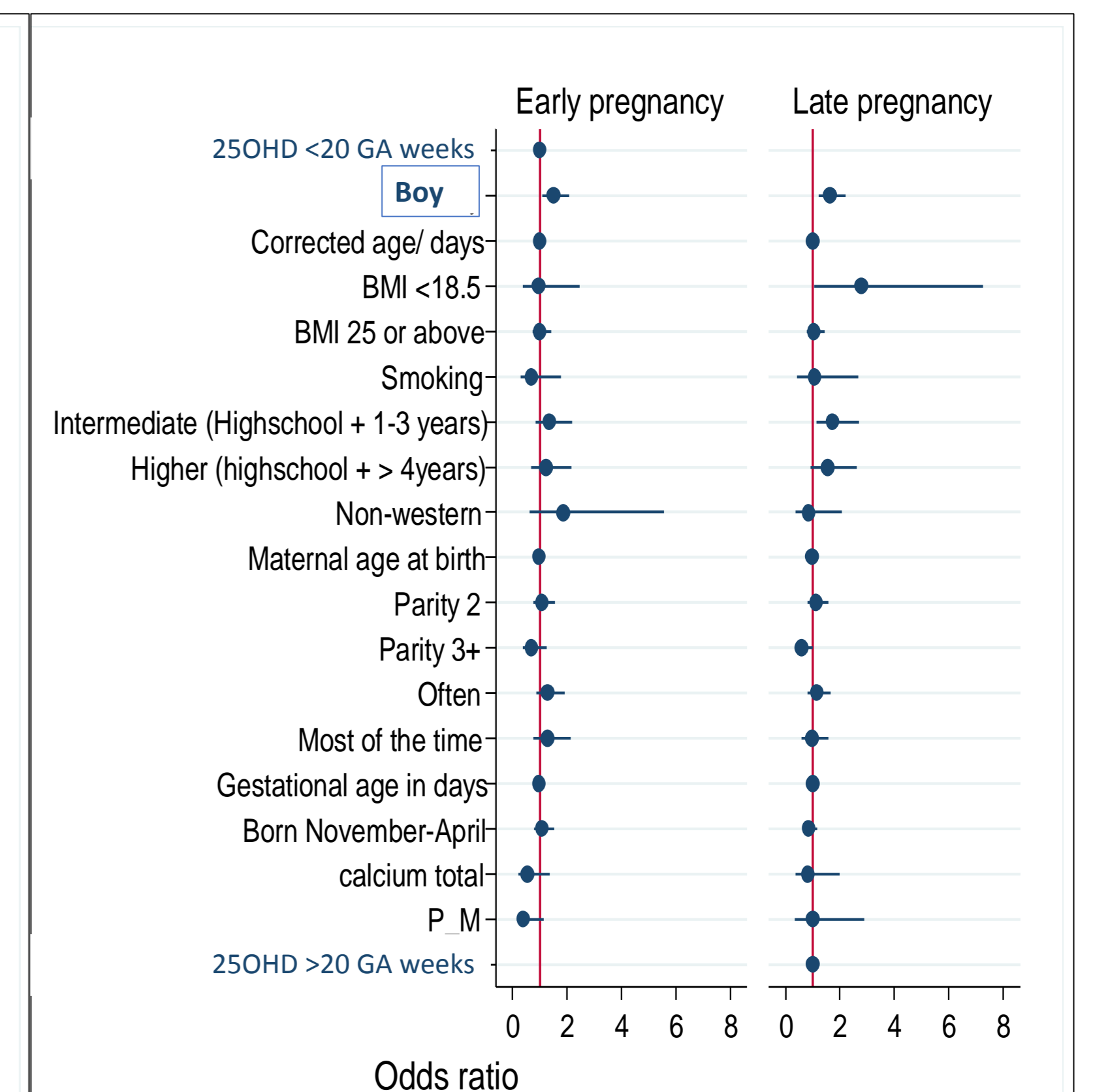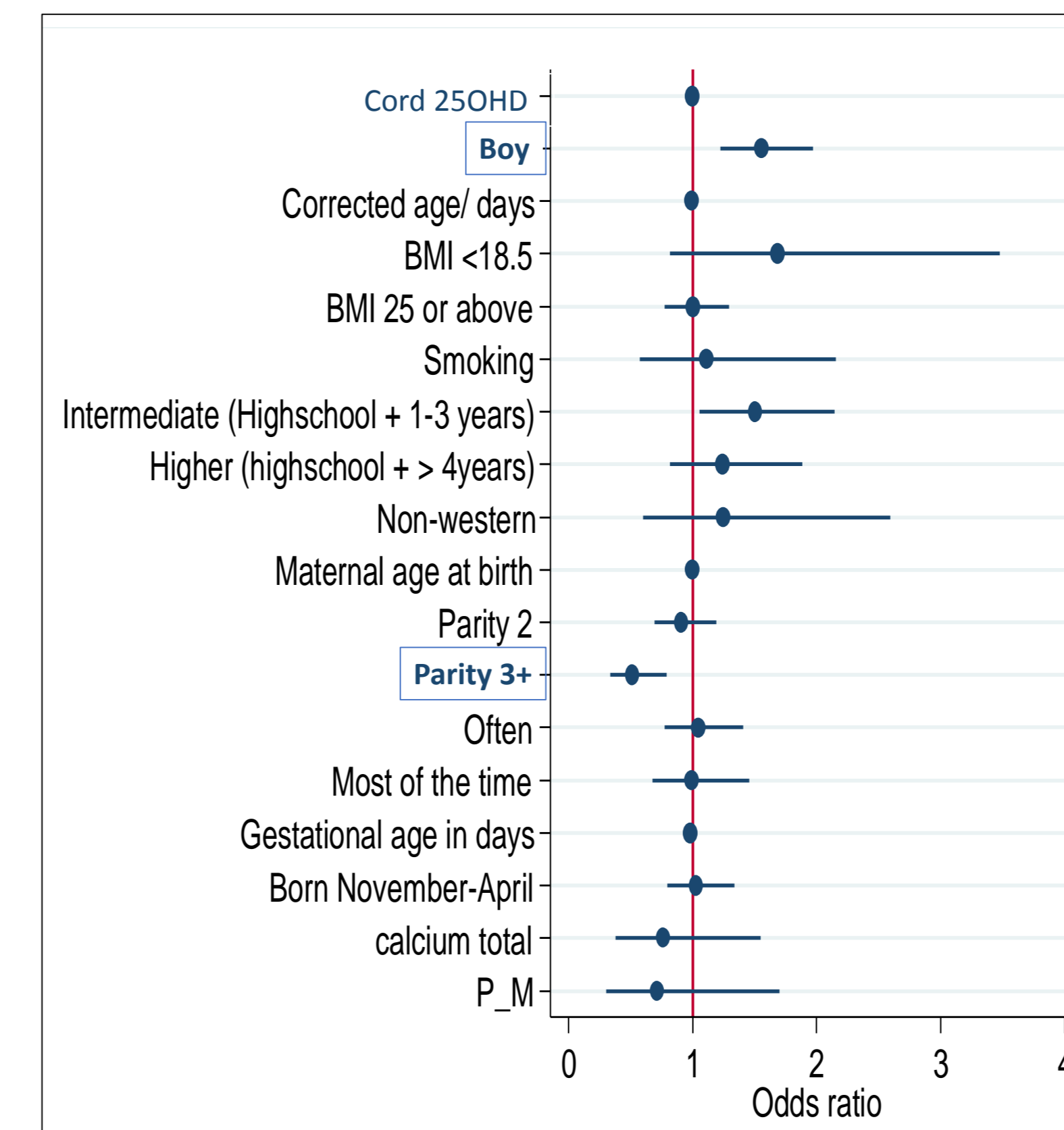

Figure 2: Adjusted associations of 25OHD with Head shape (reference: Symmetric head shape) at 3,7 months follow up, odds ratio (95 % CI). 25OHD in blue. Consistent associations with head shape are marked in bold blue and outline.

Conclusion

Associations between pregnancy and cord 25-hydroxyvitamin D levels and:

- anterior fontanel area
- head circumference
- head shape

were **not detected** in infants in a well-off, European country.

Contact information