The Parthenon Cohort comprised 663 babies without major congenital anomalies born at Holdsworth Memorial Hospital, Mysore, India, during 1997–1998. Maternal anthropometry, oral glucose tolerance test and serum 25 (OH) vitamin D, vitamin B12, folate and homocysteine concentrations were measured at 30±2 weeks of gestation. Children had detailed anthropometric assessments at birth and at 6–12-monthly intervals subsequently. Data on breast-feeding was collected during the first, second and third year follow-up visits. Detailed cardiovascular investigations were done at ages 5, 9.5 and 13.5 years. Cognitive function was assessed during childhood (9.5 years; n=542) and adolescence (13.5 years; n=545) using three core tests from the Kaufman Assessment Battery for Children and additional tests, measuring learning, long-term retrieval/storage, short-term memory, reasoning, verbal fluency, visuo-spatial ability, attention and concentration. Data on parents’ socio-economic status (SES) and education levels, maternal intelligence and home environment were recorded at the same time.

Our results showed that vitamin D and B12 deficiency was present in 67% and 41% of mothers, respectively, during pregnancy, but folate deficiency was low (~3%). The incidence of maternal gestational diabetes (GDM) was ~6%. Offspring mean birth weight was 2.97 kg. Both GDM and micronutrient imbalance as well as newborn size were associated with offspring cardiometabolic risk outcomes in childhood and adolescence.

Overall, cognitive scores were higher for girls than boys. All cognitive scores increased with increasing SES and parental educational level. Urban children performed better than rural children. Offspring cognitive scores increased linearly with increase in maternal folate levels both during childhood and adolescence (p<0.05). Offspring of GDM mothers also performed better than those born to non-GDM mothers. For each SD increase in birthweight and head circumference there was a ~0.10 SD increase in cognitive scores, independent of socio-demographic confounders (P<0.05). Breast-feeding duration was unrelated to children’s cognitive function. All the cognitive test scores increased with increase in concurrently-measured BMI and skinfold thickness (p<0.05).

In conclusion, the Parthenon cohort study found that early nutritional status predicted offspring cognitive ability during childhood and adolescence. In this population, where undernutrition is more prevalent than overnutrition/obesity, higher adiposity measures are indicative of better nutrition. Positive associations with maternal GDM indicate that fetal overnutrition in a chronically undernourished population may have beneficial effects on fetal brain growth and function.

REFERENCES