Nature and nurture work in unexpected ways to determine obesity and diabetes risk even before birth

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few too many sugary treats during pregnancy put children at higher risk of becoming overweight, A*STAR research shows, but only if their mothers are not already obese. "It is interesting to see how nature and nurture interact to affect a child's outcomes," says principal investigator Yung Seng Lee, from the A*STAR Singapore Institute for Clinical Sciences (SICS).

"Excessive and rapid growth during infancy is a risk factor for obesity, and could lead to comorbidities such as diabetes and cardiovascular disease," adds SICS research fellow Izzuddin Aris.

One of the first studies to look at the role of maternal nutrition in child development was the Dutch famine study. In 1944–1945, Germany's occupation of the Netherlands resulted in food shortages and rationing to less than a quarter of the recommended daily caloric intake for an adult. Babies born during this period had higher rates of diabetes, cardiovascular disease and obesity later in life.

Izzuddin and Lee wanted to investigate this mother–child relationship in an Asian population. "Asians are at higher risk of diabetes at a lower body mass index compared to Caucasians," says Lee. "We have to conduct our own studies to look at the determinants and risk factors, which might be different—we can't take data from the West wholesale for our public health decisions."

The source of their analysis came from GUSTO (Growing Up in Singapore Towards healthy Outcomes); a SICS-led long-term study of pregnant mothers and their babies visiting KK Women's and Children's Hospital and the National University Hospital in Singapore.

The researchers analyzed the body fat and blood sugar levels of more than 900 mothers during their pregnancies and the size and weight of their children (from newborns up to three year olds). Obese mothers were found to have heavier children compared to non obese mothers, but the two groups' sugar levels showed a different story.

In non-obese mothers, every extra half millimole of glucose per liter of blood increased their child's odds of becoming overweight by 36 per cent. Whereas in obese mothers, every extra unit decreased the odds by 41 per cent. The latter result could be due to a "mismatch" in expectations, Aris postulates. Having become used to a high-fat and high-sugar environment in the mother's womb, these children are programmed to expect a similar metabolic milieu outside the belly.

Through the GUSTO study, Izzuddin and Lee will continue to follow the children until they reach nine years. "We also plan to explore their genetic and epigenetic data to uncover the underlying pathogenic mechanisms of our results," says Lee.

More information: I. M. Aris et al. Associations of gestational glycemia and prepregnancy adiposity with offspring growth and adiposity in an Asian population, *American Journal of Clinical Nutrition* (2015). DOI: 10.3945/ajcn.115.117614

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