Large babies born to mothers with diabetes have a near-trebled risk of obesity

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New research published in *Diabetologia* (the journal of the European Association for the Study of Diabetes [EASD]) shows that children who are larger than average at birth (large for gestational age or LGA) and born to mothers with gestational diabetes are almost three times as likely to be obese as children born a normal size to diabetes-free mothers. The study is by Dr. Padma Kaul (Department of Medicine, University of Alberta, Edmonton, AB, Canada) and co-authors.

There are multiple causes of being overweight or obese in childhood. Research has established that children who are born large are more likely to be larger in childhood. Maternal weight, pre-pregnancy and gestational weight gain, and maternal diabetes status during pregnancy are established risk factors for having LGA infants. However, little is known about the relative impact of LGA and maternal diabetes during pregnancy on being overweight/obese in early childhood.

The study analysed 81,226 children born between January 2005 and August 2013. Almost all the mothers resided in the Calgary zone in the province of Alberta, Canada, with a smaller proportion from elsewhere in the state. Data on height and weight at the time of the offspring's pre-school (age 4-6 years) immunisation visit between January 2009 and August 2017, as well as breast-feeding status in the first 5 months of life, were linked with maternal hospitalisation and outpatient records and birth registry data.

Children were grouped into six categories based on maternal diabetes status during pregnancy (no diabetes, gestational diabetes or pre-existing diabetes) and birthweight (appropriate for gestational age [AGA] or LGA). WHO criteria were used to identify children who were overweight or obese. There were 69,506 children in the no diabetes/AGA group (control group), 5926 in the no diabetes/LGA group, 4563 in the gestational diabetes/AGA group, 573 in the gestational diabetes/LGA group, 480 in the pre-existing diabetes/AGA group and 178 in the pre-existing diabetes/LGA group.

Rates of being overweight/obese at pre-school age ranged from 21% in the control group to 43% in the gestational diabetes/LGA group. Rates of overweight/obesity were also high in the LGA/pre-existing diabetes group (36%) and the no diabetes/LGA group (35%). Statistical calculations showed that a child's risk of being overweight/obese was near-trebled (2.79 times increased risk) if they were in the gestational diabetes/LGA group compared to the control no diabetes/AGA group. In the pre-existing diabetes/LGA group and the no diabetes/LGA group, risk was doubled compared to controls, clearly indicating LGA as an independent risk factor for overweight/obesity in the child.

Further analysis showed that LGA alone contributed 39% to the risk of obesity in the child, much higher than that found for maternal gestational diabetes alone (16%) or pre-existing diabetes alone (15%); the risk contribution for the

combinations of gestational diabetes/LGA and pre-existing diabetes/LGA were 50% and 39%, respectively.

When the pre-existing diabetes group was further stratified into type 1 and type 2 subgroups, the authors found the prevalence of being overweight/obese to be 21% in the type 1/AGA group, 31% in the type 1/LGA group (similar to those in the no diabetes groups), 27% in the type 2/AGA group and 42% in the type 2/LGA group.

The authors explain that being LGA at birth is a potentially modifiable factor and this study highlights the need to better understand the factors associated with its incidence in order to develop strategies to reduce childhood overweight/obesity rates. The authors believe that LGA may be a surrogate marker for two variables not measured in the study: maternal weight (either excess pre-pregnancy or gestational weight gain) or glycaemic control during pregnancy.

They say: "Our study establishes that a larger proportion of excess weight in childhood can be attributed to LGA than maternal diabetes during pregnancy. We hope that these findings will reinforce public health campaigns advising women who are planning to get pregnant that, just like smoking, alcohol consumption and other lifestyle choices, their weight prior to getting pregnant, and weight gain and blood sugar control during pregnancy may have a significant impact on the future health of their children."

Breastfeeding in the first five months of life was associated with an approximately 25% lower likelihood of being overweight/obese in childhood, overall, and in all groups except gestational diabetes/LGA and pre-existing diabetes/LGA (both type 1 and type 2).

The authors say: "The protection offered by breastmilk did not extend to the gestational diabetes/LGA and pre-existing diabetes/LGA groups—not overall, nor in the type 1/LGA and type 2/LGA subgroups. If, as we believe possible, LGA is a marker for poor blood sugar control during pregnancy, further research is needed to examine whether, as suggested previously, glucose and insulin levels in the breast milk of mothers with diabetes may increase, rather than protect against, the risk of childhood obesity."

More information: Padma Kaul et al, Association between maternal diabetes, being large for gestational age and breast-feeding on being overweight or obese in childhood, *Diabetologia* (2018). DOI: 10.1007/s00125-018-4758-0

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