NEWS

Obesity, diabetes in mother up autism risk for child

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The combination of obesity and diabetes in a pregnant woman substantially increases the likelihood that her child will have autism, report two independent studies published in January. The studies also implicate the conditions in other neurodevelopmental conditions.

The findings corroborate earlier research that revealed associations between autism and either **maternal obesity** or **diabetes**, although the two conditions frequently occur together. “Our study and the previous studies all point to a similar conclusion,” says **Xiaobin Wang**, who led one of the studies at the Johns Hopkins Bloomberg School of Public Health in Baltimore.

Wang and her colleagues found that children born to women who were obese and diagnosed with diabetes before becoming pregnant have a fourfold greater risk of autism compared with children whose mothers have neither condition. Children born to obese women diagnosed with gestational diabetes, a form of the disease that can emerge when a woman is pregnant, have a threefold greater autism risk[1]. The researchers published their findings 29 January in *Pediatrics.*

In the other study, published 29 January in *Autism Research*, researchers found that mothers who have both obesity and gestational diabetes are two-and-a-half times more likely to have a child with autism than mothers with neither condition[2].

“What I really like about both studies is they looked at the collective effect” of obesity and diabetes, says **Deborah Bilder**, associate professor of psychiatry at the University of Utah in Salt Lake City, who was not involved in either study. The new studies are among the first to take this tack.

Double trouble:

Findings from previous research along these lines have been consistent in broad strokes but confusing in detail. Some studies suggested a link between autism and diabetes diagnosed before pregnancy, whereas others **implicated only gestational diabetes**. Some indicated that **weight gain during pregnancy**, but not prepregnancy weight, confers autism risk. Still others proposed that the association of maternal obesity with autism risk **may be due to underlying genetic factors**, not the excess weight itself.

Although the two new papers don’t address issues of genetics or timing, their strikingly similar findings stand out, experts say, particularly because the studies differ in their approach: The studies involved separate regions of the U.S., included different socioeconomic classes and ethnicities and had divergent study designs.

“The value of these two studies really has to do with the different study samples that are being looked at,” says **Brian Lee**, associate professor of epidemiology and biostatistics at Drexel University in Philadelphia, who was not involved in either study.

For the *Pediatrics* study, Wang and her colleagues tracked the health status of more than 2,700 mother-child pairs who are part of an ongoing study known as the **Boston Birth Cohort**. The participants include a high proportion of African-American and Hispanic women — groups that are typically under-studied.

At the time of the children's birth, the researchers asked the mothers about their height and prepregnancy weight. They looked at medical records to determine which women had diabetes either before or during pregnancy. They then followed the children to record the diagnosis of any developmental disorders.

They found that of the 2,734 children, 1,748 were typically developing, 102 had autism diagnoses, 137 had intellectual disability, 301 had attention-deficit hyperactivity disorder (ADHD) and 864 were diagnosed with other developmental disorders.

Paired patterns:

The second new study identified 503 children with autism and 1,533 children with developmental disorders such as ADHD and language problems in records from the Cincinnati Children's Hospital Medical Center. They gleaned height, weight and health information about the mothers from state birth records, which they also used to assemble a group of of 38,810 typically developing children born in the four counties the hospital serves.

Although the Cincinnati team's sample is large, state birth records are likely to be less complete and reliable than data collected for a research study. "They both have pros and cons," says **Anny Hui Xiang**, director of biostatistics research at Kaiser Permanente in Pasadena, California, who was not involved in either new study. But regardless of the study design, both new studies found similar things, "and that's pretty interesting."

The risks associated with maternal obesity and diabetes may also predispose children to other developmental problems, although the two studies differ on the details.

The Boston researchers found that women who have both obesity and diabetes are also at risk of having a child with intellectual disability, but not other developmental problems. In the Cincinnati study, by contrast, a mother who has both conditions stands an equal risk of having a child with autism or four other developmental disorders.

Causal questions:

Overall, both studies may have found an overlap between autism and other developmental conditions because they involve common changes in the brain. "Neurodevelopmental pathways leading to each different condition may not necessarily be completely separate," says Lee.

On the other hand, some of the overlap may stem from the fact that the studies **looked at relatively young children**, Bilder says. In the Boston study, half of the children were age 6 or younger, and the children in the Cincinnati study children were age 8 or younger. "Those with [autism who have] more cognitive ability are often identified later," she says.

How obesity and diabetes might affect the brain is still unclear. Many researchers suspect that inflammation, altered immune function and oxidative stress are likely to play a role. These processes all occur in both diabetes and obesity, and have separately been implicated in autism. “For the fetus, the mother’s metabolic change translates into fetal environmental change,” says Wang.

This view is in line with the idea that obesity and diabetes together raise autism risk more than either condition alone. “It could just be more severe metabolic disturbance if you have both conditions,” says **Katherine Bowers**, assistant professor of pediatrics at Cincinnati Children’s Hospital Medical Center, who led the second study.

Although the new findings can only **indicate correlations, not causal relationships**, they provide a critical replication of past results, Bowers says. “It’s really brought us to that point where it’s time to go beyond the association and try and figure out what could be driving it.”

REFERENCES:

1. Li M. *et al. Pediatrics* (2016) Epub ahead of print **PubMed**
2. Connolly N. *et al. Autism Res.* (2016) Epub ahead of print **PubMed**