Medical Xpress

Stress hormone during pregnancy linked to IQ in children

May 10 2024

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Higher levels of the stress hormone cortisol during the third trimester of pregnancy may impede intelligence quotient (IQ) scores in boys aged 7

years old, according to research presented at the 26th European Congress of Endocrinology, held 11–14 May, in Stockholm. Surprisingly, cortisol levels in the blood are not associated with IQ scores in girls, but higher urine cortisone levels improved their scores. The findings highlight the important role cortisol plays in fetal development in boys and girls independently.

Prenatal exposure to cortisol—a steroid hormone that helps the body respond to stress—is needed for fetal development and is thought to affect cognitive function in children later in life. During pregnancy, the levels of cortisol increase and pregnant women carrying girls generally secrete more cortisol than those with boys. However, in the placenta, the enzyme 11β-hydroxysteroid-dehydrogenase type 2 (11β-HSD2) regulates the amount of cortisol that reaches the fetus by converting cortisol to its inactive form known as cortisone.

Researchers from the Odense University Hospital in Denmark have previously shown that children between the ages of one and three have more advanced speech and language skills when their mothers have high levels of cortisol during their third trimester.

In this study, the researchers analyzed data on the cortisol and cortisone levels of 943 pregnant women during the third trimester and on the IQ tests of their 943 children aged 7 years old, from the Odense Child Cohort. They found that pregnant women carrying a boy had lower cortisol levels circulating in their blood than those women carrying a girl. In addition, boys exposed to higher cortisol levels in the womb scored lower on IQ tests at age 7. Girls the same age scored better on IQ tests when their mothers had higher levels of urine cortisone.

"To our knowledge, this is the first study investigating the association

between urine cortisone levels during pregnancy and IQ scores in children," said lead author, Dr. Anja Fenger Dreyer. "While other studies have only looked at cortisol circulating in the blood during pregnancy and child IQ, we are the first to look at urine samples as well as blood samples and to investigate boys and girls separately."

Dr. Fenger Dreyer added, "Our results show that girls may be more protected by the activity of placental 11β-HSD2, whereas boys may be more vulnerable to prenatal exposure of maternal physiological cortisol."

"Although our previous study showed prenatal cortisol exposure was positively associated with language development, in this study prenatal cortisol exposure—'directly' by serum cortisol and 'indirectly' by urine cortisone—is negatively associated with IQ scores," continued Dr. Fenger Dreyer.

"This may mean that the high levels of prenatal cortisol exposure might have a temporary effect on a child's cognitive development. It should also be noted that the vocabulary in toddlers was reported by parents in our previous study, while child IQ in this study was assessed by trained psychologists."

Provided by European Society of Endocrinology

Citation: Stress hormone during pregnancy linked to IQ in children (2024, May 10) retrieved 16 June 2024 from
https://medicalxpress.com/news/2024-05-stress-hormone-pregnancy-linked-iq.html