

# Potential link between high maternal cortisol, unpredicted birth complications

January 31 2024

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A snippet of hair can reveal a pregnant person's stress level and may one day help warn of unexpected birth problems, a study indicates.

Washington State University researchers measured the [stress hormone cortisol](#) in hair samples of 53 women in their [third trimester](#). Of that group, 13 women who had elevated cortisol levels later experienced unpredicted birth complications, such as an early birth or hemorrhaging.

While more research is needed with larger groups, this preliminary finding could eventually lead to a non-invasive way to identify those at risk for such complications. The researchers reported their findings in the [journal \*Psychoneuroendocrinology\*](#).

"There was otherwise nothing about these women that would suggest a disease or anything else complicating the pregnancy. This confirmed some hypotheses that levels of stress, related specifically to cortisol levels, might be associated with adverse birth outcomes," said Erica Crespi, a WSU developmental biologist and the study's corresponding author.

As part of the study, the participants all answered survey questions about their levels of psychological distress in addition to having cortisol measurements taken in the third trimester of pregnancy and after they gave birth. The women who experienced unexpected birth complications had elevated cortisol concentrations in their hair, a measure that indicates the stress hormone's circulating levels in the body during the three months prior to collection. These women also reported feelings of stress, anxiety and depression, but on average, only high cortisol levels during pregnancy showed a strong link to adverse birth outcomes.

Cortisol, a [steroid hormone](#), rises in humans and many animals to help regulate the body's response to stress, but prolonged high cortisol is associated with major health problems including high blood pressure and diabetes. Throughout pregnancy, cortisol levels naturally rise two to four times and peak during the third trimester, but the measurements in this study showed even more pronounced elevated cortisol levels among the

women who had unexpected birth complications.

"If this finding holds up, it could be a non-invasive way to get greater insight into who might be at risk because it is information we didn't get from the survey," said co-author Sara Waters, a WSU human development researcher. "This was not something we could find out just from asking people about their stress."

Two months after giving birth, the group that experienced birth complications continued to show elevated cortisol and gave survey answers indicating continued stress, anxiety and depression. At six months, their cortisol remained elevated, but they started to report lower psychological distress on the survey, which the authors noted might be a sign of recovery.

Finding ways to reduce stress around birth could help improve outcomes for both infants and mothers, the researchers said. They point out that adverse [birth](#) outcomes are rising in the country. The U.S. also notoriously has one of the highest maternal mortality rates among developed countries, with deaths disproportionately impacting Black women and other people of color.

More needs to be done to improve [health care](#) and [support systems](#) for pregnant people and new parents, Waters said. This study is also a reminder to expectant and new mothers to prioritize their health.

"It's very easy to sacrifice our own health and well-being to prioritize our children's, especially when it feels like resources are scarce," said Waters. "But our ability to show up as parents comes from a foundation of getting our needs met too—like the saying, 'you can't pour from an empty cup.'"

This study involved an interdisciplinary research team at WSU. In

addition to Crespi and Waters, co-authors include first author Jennifer Madigan, a Ph.D. candidate in stress physiology research; Maria Gartstein, a [psychology professor](#); Jennifer Mattera, a psychology Ph.D. student; and Chris Connelly, an associate professor of kinesiology. This research received support from a WSU Grand Challenges Grant as well as interdisciplinary grants from the WSU College of Arts and Sciences, and the WSU Office of Research.

**More information:** J.A. Madigan et al, Perinatal hair cortisol concentrations linked to psychological distress and unpredicted birth complications, *Psychoneuroendocrinology* (2023). [DOI: 10.1016/j.psyneuen.2023.106921](#)

Provided by Washington State University

Citation: Potential link between high maternal cortisol, unpredicted birth complications (2024, January 31) retrieved 27 April 2024 from <https://medicalxpress.com/news/2024-01-potential-link-high-maternal-cortisol.html>

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