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Better cardiovascular health in early pregnancy may offset high genetic risk

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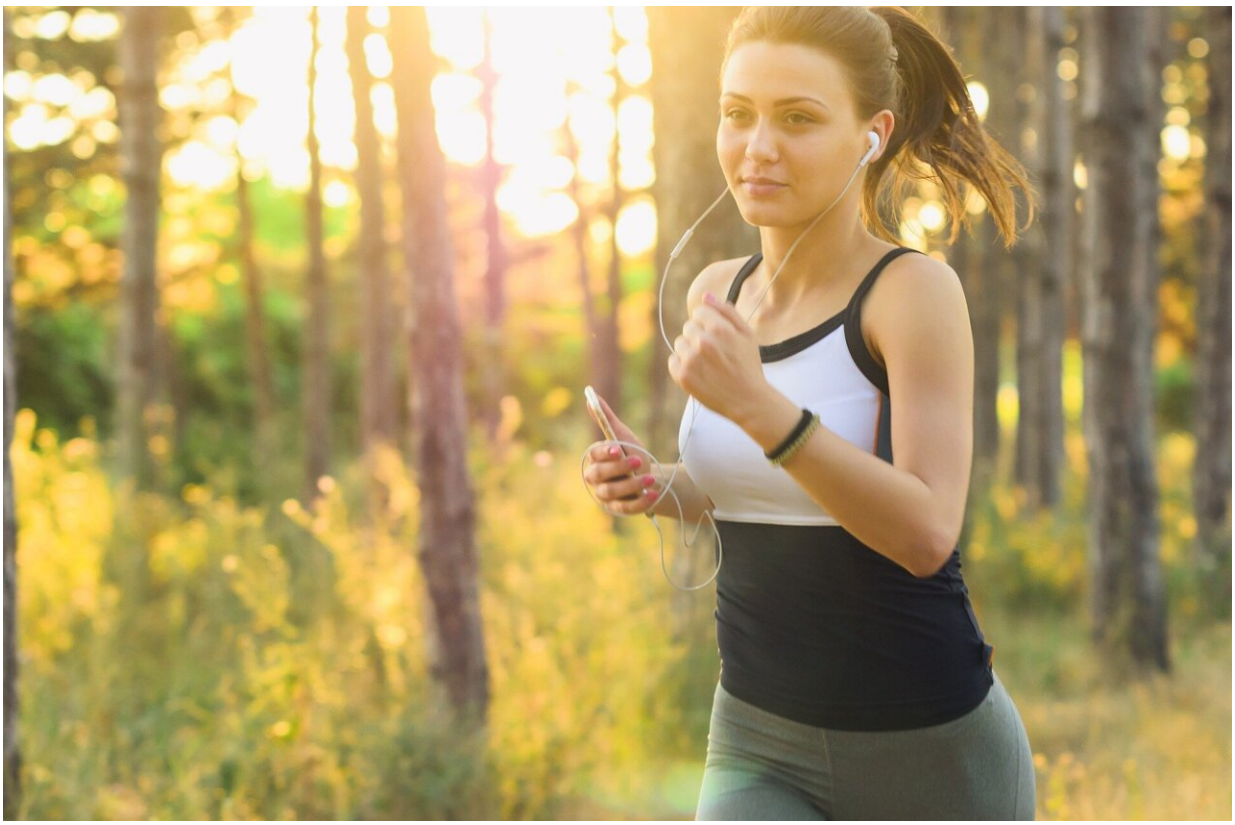

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Maintaining good cardiovascular health during the first trimester of pregnancy may offset the genetic risk of developing preeclampsia and/or gestational hypertension, according to preliminary research presented at

the American Heart Association's Hypertension Scientific Sessions 2024
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Hypertensive disorders of pregnancy (such as gestational hypertension and preeclampsia) are a leading cause of death in both expectant mothers and newborns. A validated risk model called a polygenic risk score can be used to predict an individual's chance of developing these conditions based on their genetic profile. However, it is unknown how much cardiovascular health status in early pregnancy, as measured by the American Heart Association's Life's Essential 8 (LE8) scoring, affects this risk.

"We were looking to see if there was an association between cardiovascular health during early pregnancy and risk of developing a hypertensive disorder of pregnancy such as preeclampsia or gestational hypertension, even across genetic risk groups for these diseases," said study co-author Vineetha Mathew, a fourth year M.D.-candidate at Tufts University School of Medicine in Boston.

"Our results found that across all genetic risk groups, better first trimester cardiovascular health may partially mitigate the risk of adverse pregnancy outcomes and the risk of developing hypertensive disorders of pregnancy."

The study investigated whether cardiovascular health in the first trimester of pregnancy can offset a genetic risk of developing gestational hypertension and preeclampsia during pregnancy. The researchers analyzed data on more than 5,000 individuals who were pregnant for the first time to calculate the rates of these hypertensive disorders during pregnancy.

For the analysis, researchers classified each individual's genetic risk using a previously validated polygenic risk score, which estimates

susceptibility to a disease based on the aggregate effect of millions of genetic variants across the genome.

In addition, a cardiovascular health scoring system categorizing first trimester health status from favorable to unfavorable was adapted from the Association's Life's Essential 8 and assigned to each woman. Seven out of eight of the LE8 components (diet, physical activity, sleep, nicotine exposure, diabetes, baseline blood pressure, and body mass index—not cholesterol levels) were incorporated into a cardiovascular health score for the entire cohort of pregnant individuals. Cholesterol was added for a sub-group (47%) for whom these values were measured.

The analysis examined the association of cardiovascular health and genetic risk with preeclampsia and gestational hypertension and was adjusted for age, self-reported race and ethnicity, education level and marital status.

The study found:

- Compared to unfavorable cardiovascular health (those with the lowest Life's Essential 8 score not including cholesterol), favorable cardiovascular health was associated with a 35% to 62% lower risk of developing a hypertensive disorder of pregnancy across all genetic risk groups.
- A higher genetic risk combined with lower cardiovascular health was associated with a higher risk of developing both diseases.
- The incidence of hypertensive disorders of pregnancy ranged from 11% (low genetic risk, favorable cardiovascular health) to 37% (high genetic risk, unfavorable cardiovascular health).
- These results were broadly consistent when examining preeclampsia and gestational hypertension separately and also after incorporating cholesterol values into a subset analysis of 2,560 participants (using a complete Life's Essential 8 score).

- Among cardiovascular health components, higher body mass index, high blood pressure and poor diet contributed most to population-level risk for developing hypertensive disorders of pregnancy (25%, 14% and 12%, respectively).

"What was really interesting about our findings was how cardiovascular health in the first trimester appeared to be protective for all. We saw that the odds of developing a hypertensive disorder of pregnancy among those with a high genetic risk combined with favorable cardiovascular health was comparable or even better than those with low genetic risk but unfavorable cardiovascular health," Mathew said.

"Based on our research, we want to underscore the importance of preconception and early pregnancy cardiovascular health counseling. OB-GYN and primary care professionals should emphasize cardiovascular health improvement, healthier nutrition, weight management and healthy blood pressure to patients who are considering pregnancy," Mathew said.

"Prevention is becoming the forefront of medicine. Start early, even before pregnancy, when you are just considering pregnancy. We want to target cardiovascular health at that stage because it can have an impact on pregnancy outcomes and on later-life cardiovascular disease."

Study details, background and design:

- 5,446 first-time mothers in their first trimester of pregnancy, average age of 27. 78% of participants self-identified as white adults; 11% as Black adults; and 11% as multi-racial adults or adults of "other" race. 87% of the total participants self-identified as non-Hispanic and 13% identified as Hispanic.
- Among the 5,446 participants, about one-quarter (1,339) developed a hypertensive disorder of pregnancy (344 preeclampsia, 995 gestational hypertension).

- Data was from the Nulliparous (First) Pregnancy Outcomes Study: Monitoring Mothers-To-Be (nuMoM2b), conducted between 2010 and 2013.
- For the current analysis, each patient was assigned a polygenic risk score describing their chances of developing a hypertensive disorder of pregnancy.
- Because cholesterol values were not available for all participants, a secondary analysis was conducted incorporating a subset (47%) of participants with available cholesterol measures in the first trimester.
- The analysis was performed through the Broad Institute of MIT and Harvard, as well as Massachusetts General Hospital, in collaboration with Columbia University.

The study's limitations included cholesterol metrics for about half the participants missing from the main analysis. Future work for the researchers will involve expanding the study to include a more diverse population and to incorporate cardiovascular health metrics throughout pregnancy as well as risk patterns in subsequent pregnancies.

"These results highlight the importance of the cardiovascular health construct, as measured by the American Heart Association's Life's Essential 8 score, across the entire life course including during pregnancy. The impressive reductions in risk for hypertensive disorders of pregnancy associated with higher cardiovascular health demonstrate that there is much within our control to help patients avoid these potentially lethal pregnancy complications," said Donald M. Lloyd-Jones, M.D., Sc.M., FAHA, chair of the writing group the Association's Presidential Advisory unveiling Life's Essential 8 and a past volunteer president of the American Heart Association.

Lloyd-Jones is also the chair of the department of preventive medicine, the Eileen M. Foell Professor of Heart Research and professor of

preventive medicine, medicine and pediatrics at Northwestern University's Feinberg School of Medicine in Chicago.

"It is particularly notable that high cardiovascular health scores, achievable through a focus on healthy lifestyle, may help mitigate the risk conferred by a person's genes," he added.

More information: ORAL Presentation 48 in Session 18.A TAC Oral Abstract Award Competition is Saturday September 7, 2024, at 2:15 p.m. CT.

Provided by American Heart Association

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