

Study investigates link between lactation and visceral, pericardial fat

9 April 2021



TTUHSC's Duke Appiah, Ph.D., and a team of collaborators recently completed a study to see if the presence of excess visceral and pericardial fat results in a lower risk for developing cardiovascular disease and diabetes for women who breastfeed. Credit: TTUHSC

As demonstrated by multiple studies over the years, women who breastfeed have a lower risk for developing cardiovascular disease and diabetes when compared to those who don't or can't. However, the mechanisms by which these risks are reduced for lactating women are still not fully understood.

Duke Appiah, Ph.D., an assistant professor of public health at the Texas Tech University Health Sciences Center and director of the university's master's program in public health, said the presence of excess fat, specifically visceral and pericardial fat could help explain this finding. Using that hypothesis, Appiah and a team of researchers recently completed a study titled, "The Association of Lactation Duration with Visceral and Pericardial Fat Volumes in Parous Women: The CARDIA Study." *The Journal of Clinical Endocrinology & Metabolism* published the results in its February issue.

The Appiah team included Cora E. Lewis, M.D., and James M. Shikany (University of Alabama at Birmingham); David R. Jacobs, Jr., Ph.D., and Myron Gross, Ph.D., (University of Minnesota); Jeff Carr, M.D., (Vanderbilt University Medical Center); and Charles P. Quesenberry, Jr., Ph.D., Stephen Sidney, M.D., and senior research scientist Erica P. Gunderson, Ph.D., (Kaiser Permanente Northern California). The National Institute of Diabetes and Digestive and Kidney Diseases provided funding to Gunderson, the study's senior author, for creating the pregnancy-related derived variables, and for the analysis of lactation and the development of cardiometabolic diseases in Coronary Artery Risk Development in Young Adults (CARDIA) study women.

Visceral fat, often referred to as active fat, potentially can increase the risk of developing dangerous health issues such as [cardiovascular disease](#), heart attacks, Type 2 diabetes, stroke, breast and colorectal cancer and Alzheimer's disease. Though it can build up in the arteries, visceral fat typically is stored within the abdominal cavity near critical organs such as the stomach, liver and intestines.

Pericardial fat, a deposit of fatty tissue located on the outside of the heart, also may influence certain cardiovascular conditions.

"We know these two organ-related fats contribute to diabetes as well as cardiovascular disease, so we wanted to see how breastfeeding influences these types of fat," Appiah explained. "If breastfeeding does affect these fats, then it means it could provide a physiologic mechanism by which we can understand how breastfeeding actually affects these two main diseases. That was basically the motivation for this study."

Because these fats are related to insulin production and other cardio metabolic factors, Appiah said weight change could influence the relationship

between breastfeeding and these fats. For instance, the visceral fat that builds up around the abdomen tends to also include adipokines, which are cytokines produced by fatty tissue. Adipokines also secrete hormones, which influence the insulin sensitivity of the muscles. When the amount of visceral fat increases, so too does the competition for insulin binding sites, which increases the risk of developing insulin resistance or glucose intolerance.

An increase in pericardial fat also puts additional weight on the heart and can affect its contractivity, or how it beats, which also could influence other cardiovascular diseases. Though many studies have looked at visceral fat, or abdominal fat, and its influence on cardiometabolic health, Appiah said not as much is known about pericardial fat.

"However, there is still enough science showing that the more pericardial fat you have, the more likely you are to get cardiovascular disease," Appiah said. "What this really means is that breastfeeding affects weight gain, and so women who breastfeed typically will not gain more weight, which will also influence less fat buildup in the abdomen or around their heart."

Gunderson said previous studies on women in the 30-year CARDIA study have shown lactation duration is associated with a 50% lower relative risk of progression to Type 2 diabetes in women, independent of their metabolic profiles and body size before pregnancy, social factors and lifestyle behaviors. Lactation also may prevent future development of cardiovascular disease in women by reversing hypertriglyceridemia during pregnancy through the removal of excess fatty acids in the production of breast milk and by preventing the lowering of high-density lipoprotein cholesterol after delivery.

"This lower pericardial fat was mediated only partially by subsequent weight gain, indicating that there are powerful systemic metabolic changes independent of overall adiposity," Gunderson said. "Thus, lower fat deposition in the heart and other organs might potentially explain the protective benefits of lactation to prevent cardiovascular disease in women."

To generate data for his research, Appiah used the CARDIA study, with which he also is affiliated. CARDIA, sponsored by the National Institutes of Health-National Heart Lung and Blood Institute, is a long-term study of cardiovascular disease that includes more than 5,000 Black (48%) and white (52%) adult women who were aged 18 to 30 years when the study began in 1985-1986.

As one of the longest and continuous studies of its kind, the CARDIA study has continued to monitor these participants for more than 30 years and has aided researchers in understanding how factors that appear in early adulthood can increase the risk of cardiovascular disease later in life.

"There are not many studies out there which actually have followed young women all through their birth years and measured cardiovascular risk factors on all of them," Appiah said. "It also includes cumulative measures of lactation, which made CARDIA more unique to address this research because it's not just one episode of breastfeeding that is important. We wanted to look at the entire reproductive lifespan and CARDIA was the best study to do that."

Gunderson, who also is a professor of health systems science at the Kaiser Permanente Bernard J. Tyson School of Medicine, said the CARDIA data enabled the research team to account for biomarkers and metabolic risk factors before pregnancy that might influence future adiposity and cardiovascular health.

"After accounting for lifestyle behaviors and other risk factors across the life course, the lower visceral and pericardial fat among women with longer lactation persisted," Gunderson said. "This indicates lactation may have effects that persist many years through midlife."

After their initial enrollment in the study in 1985-1986, women in the CARDIA study update their measurements and other history approximately every five years, giving investigators a clearer picture of a woman's entire reproductive lifespan. The results, as Appiah discovered in his research, show that women who breastfed more over the duration of their reproductive years

experienced less weight gain and tended to have less fat buildup around the abdomen or around the heart.

Appiah said these results support some of the findings made by the American College of Pediatricians (ACP), which recommends breastfeeding exclusively for the first six months of a child's life, and then combining breastfeeding with age-appropriate food between six months and 12 months the food can be mixed. However, ACP also recommends that [women](#) should breastfeed for two years or longer if they are able.

"Now we are showing that, yes, breastfeeding more is actually beneficial to a woman's health and can help to prevent cardiovascular [disease](#)," Appiah added. "This study is providing more proof for some of these recommendations that have been given previously."

Appiah said there are other issues related to lactation that his team is investigating, including looking at how lactation influences cytokines and other hormones.

"We know that these fats produce adipokines and other cytokines that are associated with plaque buildup in the arteries," Appiah said. "Therefore, we want to look at how these cytokines may be influenced by lactation. We also want to look at how lactation may affect left ventricular structure and function independent of pericardial fat. Those are the next steps for this project."

More information: Duke Appiah et al, The Association of Lactation Duration with Visceral and Pericardial Fat Volumes in Parous Women: The CARDIA Study, *The Journal of Clinical Endocrinology & Metabolism* (2021). [DOI: 10.1210/clinem/dgaa980](#)

Provided by Texas Tech University

APA citation: Study investigates link between lactation and visceral, pericardial fat (2021, April 9) retrieved 10 July 2022 from <https://medicalxpress.com/news/2021-04-link-lactation-visceral-pericardial-fat.html>

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