

Obesity in pregnant women could alter structure and function of placenta, raising poor health outcome risk

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Maternal obesity alters the structure of the placenta (a vital organ that nourishes the baby during pregnancy) more than gestational diabetes

mellitus (GDM; a condition characterized by poor glucose control in pregnancy).

The new insight, published in *The Journal of Physiology*, enhances understanding about the mechanisms underlying poor [pregnancy](#) outcomes and the subsequent greater risk of poor neonatal and offspring health. The identification of specific changes in the placenta could lead to the potential development of future placenta-targeted treatments or screening tests that may improve the health outcomes of the mother and offspring, particularly in low-middle income countries.

The research conducted by scientists in South Africa in alliance with those in England is the first study to investigate the effects of maternal obesity and GDM simultaneously and to be carried out in a low-middle income country, where obesity and GDM during pregnancy have a substantial health and [economic impact](#). Previous studies have investigated obesity and GDM separately and have only been carried out in [high-income countries](#).

The rates of obesity and GDM, the development of poor glucose handling during pregnancy, are increasing worldwide. Both are linked to multiple maternal and fetal complications, such as increased risk of fetal death, stillbirth, infant death and higher infant birth weight. It is not known how these complications arise.

The researchers found that [maternal obesity](#), more than GDM, reduced the formation of the placenta, its blood vessel density and surface area, and its capacity to exchange nutrients between the mother and developing child. Both obesity and GDM impact placental hormone production and inflammation markers, suggesting that the placenta is indeed functioning abnormally.

The study looked at 71 women who were black or of mixed ancestry. Of

those, 52 were obese and 38 had developed GDM. The researchers conducted the study using clinical profiling, deep structural examination and molecular analysis of the placenta, and biochemical measurements of maternal and infant cord blood to examine the effect of obesity and GDM in this group of expectant women.

Lead author Professor Amanda Sferruzzi-Perri of the University of Cambridge said, "For the first time we have looked at the effects of both obesity and GDM on the placenta in black and mixed-ancestry woman, who are an understudied group, and what effect that these conditions might have on them and their children. It was important to discover that obesity has more of an influence than GDM on pregnancy outcomes for both the mother and the child."

The study limitation is that with a [small sample size](#) of 71 women, it was not possible to determine what impact the sex of the fetus has on these placental changes. The non-obese group of women also included women who would be termed overweight. The researchers would like to carry out further research in obese, overweight and lean women with and without GDM, and explore the impact of the sex of the fetus. They would then like to study how obesity, GDM and treatments, like metformin a drug that lowers [blood glucose levels](#), interact to determine pregnancy outcomes and the long-term health of the child.

Lead co-author Professor Mushi Matjila of the University of Cape Town said, "South Africa is burdened by a quadruple disease burden of communicable and non-communicable disease, along with high maternal and child morbidity and mortality, and deaths related to violence and injuries. Additionally, we have one of the highest rates of female obesity globally, which undoubtedly fuels the non-communicable disease burden and contributes to maternal, neonatal and child morbidity. As obesity and GDM often coexist, the study highlights the importance of obesity over GDM in modulating placental structure and function, and begins to

piece together how these placental changes may explain observed complications (e.g., intrauterine death and stillbirths) and increased future non-communicable disease risk for both mother and baby."

More information: Obesity and gestational diabetes independently and collectively induce specific effects on placental structure, inflammation and endocrine function in a cohort of South African women, *The Journal of Physiology* (2023). [DOI: 10.1113/JP284139](https://doi.org/10.1113/JP284139)

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