

Low vitamin D in pregnancy linked to potentially harmful vaginal bacteria in black women

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Dr. Carol Wagner, a neonatologist at the Medical University of South Carolina (MUSC), led a recent MUSC study, reported in the *Journal of Perinatology*, examining the effects of vitamin D on the vaginal microbiome. She worked closely with Kim Jefferson of Virginia Commonwealth University. Credit: Sarah Pack, Medical University of South Carolina

Vitamin D, sometimes known as the sunshine vitamin, has long been known to be important for a healthy pregnancy. Pregnant mothers take vitamin D supplements to ensure their own health and that of their unborn child.

But how does [vitamin D](#) affect the bacteria residing in the vagina, known as the [vaginal microbiome](#), during pregnancy?

That depends on the mother's race, according to a recent study by researchers at the Medical University of South Carolina (MUSC) and Virginia Commonwealth University (VCU).

Their findings, published online in March in the *Journal of Perinatology*, are being featured as part of a collection of manuscripts from the integrative Human Microbiome Project (iHMP/HMP2) published today in the *Nature* family of journals.

The natural [microbiome](#) is made up of "friendly bacteria" that help prevent infection by harmful microbes. Disruptions of that natural microbiome can leave [women](#) vulnerable to infection.

The research team showed that the makeup of bacteria in the vaginal microbiome differed between [black women](#) with lower vitamin D and white women with higher vitamin D.

In the MUSC trial of 387 healthy pregnant women of diverse ethnicity, black women with lower levels of vitamin D during pregnancy had more *Megasphaera* - a type of bacteria linked to bacterial vaginosis, which is a common dysbiosis or disorder in the vaginal canal. In contrast, white women with higher levels of vitamin D had more lactobacilli, a type of bacteria that promotes vaginal health. The study did not find any bacteria significantly associated with vitamin D status in Hispanic women. The Kellogg Foundation and the National Institutes of Health (NIH) funded

the trial.

Bacterial vaginosis, which is the disruption of a healthy vaginal microbiome, can increase the risk for infertility, spontaneous abortion, and preterm birth.

Black women are twice as likely to be diagnosed with bacterial vaginosis. According to the Centers for Disease Control and Prevention, they are more than twice as likely to give birth early preterm—less than 33 weeks into pregnancy—than [white women](#). Black women are also more likely to be deficient in vitamin D.

"If you have a rich, darker pigment, you need more sunlight exposure to penetrate through the melanin in your skin to activate the conversion of 7-dehydrocholesterol to vitamin D," explains Carol Wagner, M.D., a neonatologist at MUSC Children's Health who led the study.

Wagner teamed up with Kimberly Jefferson, Ph.D., a bacteriologist at VCU, to investigate a possible link between racial disparities in vitamin D deficiency, bacterial vaginosis, and pregnancy outcomes.

A team of investigators at VCU, which includes Jefferson, Gregory Buck, Ph.D., and Jerome Strauss, M.D., Ph.D., lead the NIH Human Microbiome Project-funded study "Multi-Omic Microbiome Study: Pregnancy Initiative (MOMS-PI)." The study is focused on the role of the vaginal microbiome in pregnancy.

"An association between vitamin D deficiency and bacterial vaginosis has been observed in the past," says Jefferson.

"We wanted to know whether certain bacterial taxa could be implicated and whether these taxa were associated with preterm birth."

Women enrolled in the MUSC trial were followed from their first trimester until delivery. One group of women took 400 international units (IU) of vitamin D per day, which is the average dose found in prenatal vitamins. The other group took 4400 IU per day. Wagner and her colleagues have previously shown that to be a safe and effective dose for achieving vitamin D sufficiency in pregnant women, regardless of race.

The researchers evaluated vitamin D status monthly by measuring levels of a vitamin D metabolite. The South Carolina Clinical & Translational Research (SCTR) Institute's Research Nexus provided laboratory support. Vaginal swabs were taken at each visit, and samples were sent to VCU for analysis.

On average, women taking the 4400 IU supplement per day achieved greater than 40 ng/mL of the metabolite by the end of the study, which is a healthy range for pregnant women. These women had vaginal microbiomes with higher levels of healthy lactobacillus bacteria compared to women with

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