Poor sleep in pregnancy can disrupt the immune system and cause birth-related complications

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Poor sleep quality and quantity during pregnancy can disrupt normal immune processes and lead to lower birth weights and other complications, finds a University of Pittsburgh School of Medicine study published today in the journal *Psychosomatic Medicine*. Women with depression also are more likely than non-depressed women to suffer from disturbed sleep and to experience immune system disruption and adverse pregnancy outcomes.

"Our results highlight the importance of identifying sleep problems in early pregnancy, especially in women experiencing depression, since sleep is a modifiable behavior," said Michele Okun, Ph.D., assistant professor of psychiatry at Pitt's School of Medicine and lead author of the report. "The earlier that sleep problems are identified, the sooner physicians can work with pregnant women to implement solutions."

Adequate and high-quality sleep, both in pregnant and non-pregnant women as well as men, is essential for a healthy immune system. Pregnancy is often associated with changes in sleep patterns, including shortened sleep, insomnia symptoms and poor sleep quality. These disturbances can exacerbate the body's inflammatory responses and cause an overproduction of cytokines, which act as signal molecules that communicate among immune cells.

"There is a dynamic relationship between sleep and immunity, and this study is the first to examine this relationship during pregnancy as opposed to postpartum," added Dr. Okun.

While cytokines are important for numerous pregnancy-related processes, excess cytokines can attack and destroy healthy cells and cause destruction of tissue in pregnant women, thereby inhibiting the ability to ward off disease. For expectant mothers, excess cytokines also can disrupt spinal arteries leading to the placenta, cause vascular disease, lead to depression and cause pre-term birth.

Previous studies conducted postpartum have shown higher inflammatory cytokine concentrations among women who experienced adverse pregnancy outcomes such as preeclampsia and pre-term birth. While infection accounts for half of these adverse outcomes, researchers discovered that behavioral processes such as disturbed sleep also may play a role, given the relationship between sleep disturbance and immune function. Furthermore, higher concentrations of inflammatory cytokines also are found in depressed individuals.

The study is the first to evaluate all factors—inflammatory cytokines, depression and insomnia—and their possible combined effect on pregnant women. The study examined nearly 170 women, both depressed and not depressed, at 20 weeks of pregnancy and analyzed their sleep patterns and cytokine production levels over the course of 10 weeks (pregnancy-related physiological adaptations are in flux prior to 20 weeks).

The findings reveal:

- Women with depression and poor sleep are at greatest risk for adverse birth-related outcomes. Cytokine levels may be one biological pathway through which this is accomplished, particularly with regard to preterm birth.
- Any shift in immunity, such as poor sleep and/or depression, could set the stage for increased risk for adverse outcomes.
- At 20 weeks, depressed pregnant women

have higher levels of inflammatory cytokines compared to non-depressed women.
- At 30 weeks of pregnancy, differences in cytokines among depressed and non-depressed women were negligible, likely because as pregnancy progresses, levels of cytokines normally increase.

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