

Study examines maternal metabolic factors and early-onset puberty

16 April 2018

In a study of more than 15,000 girls and their mothers—all Kaiser Permanente members in Northern California—maternal overweight and hyperglycemia were linked to the earlier onset of puberty in girls 6 to 11 years old. Early puberty has been linked to multiple adverse health developments as girls grow up.

The study, "Associations between maternal obesity and pregnancy hyperglycemia and timing of pubertal onset in adolescent girls: A population-based study," was published today in *American Journal of Epidemiology*. The girls in the study were from diverse cultures and ethnicities.

"We know that maternal weight can influence childhood weight. What we are learning is that the in utero environment may also affect the timing of future pubertal [development](#) in offspring, which makes sense since human brains are developed in utero and the brain releases hormones affecting puberty," said lead author Ai Kubo, MPH, Ph.D., research scientist with the Kaiser Permanente Northern California Division of Research.

This research builds on previous Kaiser Permanente research that demonstrated earlier onset of puberty in American girls, as well as the possible role of environmental, perinatal and other risk factors. Early puberty, including the [early onset](#) of breast development or menarche (initiation of menstruation), increases the risk of adverse health outcomes including obesity, type 2 diabetes, polycystic ovarian syndrome, and cancer in adolescence and adulthood. For girls, it has been linked to a higher risk of adverse emotional and behavioral outcomes including depression, anxiety, earlier sexual initiation and pregnancy.

In 2010, Kaiser Permanente pediatricians in Northern California began routinely documenting Tanner stages, a standardized measure of pubertal development, in electronic health records during routine pediatric exams. This study is the

largest to link the Tanner-stage measurements of girls with the medical records of their mothers in order to assess the role of pregnancy-related factors on pubertal timing.

Researchers found that maternal obesity (body mass index of 30 or more) and overweight ([body mass index](#) between 25 and 30) in mothers was associated with 40 percent and 20 percent greater chance of earlier breast development in girls, respectively. The study also found a 7-month difference in onset of breast development in daughters of obese versus underweight mothers.

For pubic hair development, similar associations between maternal obesity and earlier onset were found. However, the data suggest that the associations may differ by race and ethnicity. For instance, Asian girls with obese mothers were 50 percent more likely to experience earlier onset of pubic hair than Asian girls with normal-weight mothers, while there were no associations among African-American girls.

The study also found a significant relationship between hyperglycemia (elevated blood sugar during pregnancy) in mothers and the earlier onset of [breast development](#), but not in mothers with gestational diabetes.

"It's possible that women with the diagnosis of gestational diabetes were more careful about weight and diet, which might have changed the amount of weight gain and offspring development patterns, but other studies need to replicate the finding to be able to conclude that there is an association," Kubo noted.

Senior author Lawrence H. Kushi, ScD, research scientist with the Division of Research, said the study provides new avenues for slowing the trend toward earlier sexual maturation in girls.

"Understanding the intergenerational effects of in utero exposures is helping health care systems

such as Kaiser Permanente to develop new strategies for assisting women to manage weight and hyperglycemia before and during pregnancy, not only for their own health, but also for that of their children."

Kaiser Permanente, the nation's largest integrated health system, is uniquely positioned to conduct research over the life course because its members stay with the health system for many years. This stable membership—in conjunction with comprehensive electronic medical records—enables studies such as this one, in which the long-term effects of exposures during pregnancy can be examined. For example, previous studies have examined the relationships between breastfeeding and the risk of breast cancer recurrence; [maternal obesity](#), [gestational diabetes](#) and the early onset of puberty; and the early onset of puberty and obesity in [girls](#).

Provided by Kaiser Permanente

APA citation: Study examines maternal metabolic factors and early-onset puberty (2018, April 16) retrieved 14 August 2018 from <https://medicalxpress.com/news/2018-04-maternal-metabolic-factors-early-onset-puberty.html>

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