Little is understood about alcohol's effect on fetal development, Georgetown researchers say

EurekAlert

Washington, DC It's long been known that alcohol use in pregnancy can lead to children with mental retardation and birth defects, but researchers who study fetal alcohol syndrome (FAS) have not made definitive progress on preventing the disorder, detecting it early, or effectively treating it, say researchers from Georgetown University Medical Center.

In the issue of *Developmental Neuroscience*, four first-year medical students at Georgetown University School of Medicine looked into the science and clinical treatment of FAS, and found that although there is much ongoing study, no new medical strategies exist to change the grim outcome that can occur when a fetus is exposed to alcohol.

"Although there is a lot of research in the field to determine how alcohol acts on the developing brain, there is not much translation into the clinic," says Sahar Ismail, now a second year medical student. "What surprised us the most was the lack of sensitive and specific diagnostic tools to identify children with FAS, given its prevalence and harmful effects on the child, family, and society."

Working with her on the study were medical students Stephanie Buckley, Ross Budacki, and Ahmad Jabbar each student contributed equally. Their study was a project for the Sexual Development and Reproduction Module under directorship of G. Ian Gallicano, PhD, an associate professor in the Department of Biochemistry and Molecular & Cellular Biology.

"This is a very important review, because it combed the research literature on FAS, and concluded that nothing has changed clinically," Gallicano says. "Not every woman who drinks alcohol will have a child with FAS, but because so much remains unknown, women are still advised not to drink any time during pregnancy."

Even the question of whether alcohol is a teratogen (a chemical that causes nervous system abnormalities) in the first days or weeks of pregnancy when a woman may not know she is pregnant has not been answered fully, says Ismail. Mouse studies show alcohol can have detrimental effects at any stage of fetal development, but "only so much can be concluded about humans from mouse studies," she says. "All we can say now is that there is no safe period to drink."

What is clear, however, is that alcohol is the leading cause of preventable mental retardation, the researchers say. FAS is relatively uncommon, affecting .2 to 1.5 live births in every 1,000, but fetal alcohol spectrum disorders (FASD), the less severe form of FAS, is much more common and has a broad range of the same symptoms, they say. "Taken together, both FAS and FASD, are more common than the public

realizes but are entirely preventable," Ismail says.

The study authors say FAS research shows:

Alcohol can have a range of effects on the baby but the fetal brain is particularly at risk because of its complex blood networks. Alcohol is carried from the mother to the child through blood that flows through the umbilical cord.
Many factors influence the severity of alcohol's effects, such as maternal genetics, increased maternal age, history of alcohol abuse, poor prenatal care. In the genetics realm, for example, researchers have found that women with a more efficient enzyme that breaks down alcohol have a decreased risk of giving birth to a child with FAS.
Alcohol can cause dramatic and irreversible effects on the fetus, such as developmental delay, head and facial irregularities, seizures, hyperactivity, attention deficits, cognitive deficits, learning and memory impairments, poor psychosocial functioning, facial irregularities, and motor coordination deficits. However, the exact developmental phases in which alcohol has these specific effects on the fetus are not entirely known
Based on animal studies, consumption of alcohol during the times in animals that correspond to the first 2-3 weeks in human brain growth are detrimental to the brain. But much remains unknown about alcohol's vast mechanism in growth development in humans, most importantly on neurogenesis.
It is very important to identify FAS early in life in order to provide the child with the appropriate counseling and guidance as early as possible. But, at this point, there is no treatment or specific and sensitive diagnostic tools to diagnose FAS early in pregnancy or early after birth. Still, the authors say there is ongoing research aimed at devising better diagnostic tools for FAS. These include a panel of genes that are altered in a developing fetus and a kit to examine a newborn's stool for telltale chemicals.
Research is underway to find biomarkers that can inform physicians if a pregnant woman is using, or chronically abusing, alcohol. One marker, for example, can be detected in a woman's bloodstream for at least 28 days after alcohol use. Other researchers are studying biomarkers in amniotic fluid that can distinguish between high-risk and low-risk pregnancies. Still, the authors say there is comparatively little investigation on these ideas.
Prevention of FAS is an important goal primarily because so little is understood about the adverse effects that alcohol has on the developing fetus. Current prevention programs focus on educating potential mothers at risk for conceiving a child with FAS. However, potentially powerful approaches are being studied in animals, such as the use of agents to protect the developing brain early in pregnancy or to treat brain malformations caused by alcohol exposure. Although there is vast research in this area, clinical strategies to reverse the effects of alcohol are not foreseeable in the near future, the authors say.

SOURCE [1]

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