

Fellows Column: Clinical Pearl: Maternal Marijuana Use and Its Lasting Impact

Suha Godil, OSM3

“The legalization of marijuana has become a highly debated topic in recent years, with 23 states, two territories, and the District of Columbia legalizing the drug for recreational use. (1) The legalization was a social justice initiative as marijuana laws disproportionately affected members of minority communities and led to mass incarceration. (2) ”

The legalization of marijuana has become a highly debated topic in recent years, with 23 states, two territories, and the District of Columbia legalizing the drug for recreational use. (1) The legalization was a social justice initiative as marijuana laws disproportionately affected members of minority communities and led to mass incarceration. (2) Within the United States, marijuana is the most used federally illegal drug among pregnant women. (3) No amount of marijuana consumption is safe during pregnancy, as it is associated with adverse perinatal and neurodevelopmental outcomes. (3) With the increasing prevalence of marijuana use, there is a decreasing perception of the risk of harm, with impacts extending into all realms of our healthcare system. (4)

Prior to conception, maternal marijuana use can impact uterine receptivity during implantation and can also cause fallopian tube dysfunction as the fertilized egg flows into the uterus. (5)

Outside of recreational use, marijuana is also used during pregnancy as a potential treatment for hyperemesis gravidarum. (6) Despite this medicinal potential, it is critical to consider all associated risks. One rare but serious complication is cannabinoid hyperemesis syndrome, where marijuana use can have a paradoxical effect and cause severe nausea and vomiting, with severe health risks to both the mother and fetus. (6,7)

The endocannabinoid system connects body processes such as memory, appetite, sleep, pain, pleasure, movement, coordination, and the immune system. Tetrahydro cannabinoid (THC) can also affect the release of neurotransmitters like dopamine, serotonin, and GABA, further modulating these processes. (5)

In utero, cannabinoids are lipophilic and readily cross the placenta, attaching to CB1 and CB2 cannabinoid receptors in the placenta, brain, kidneys, lungs, and liver. The CB1 receptor in the placenta is involved with serotonin transporters that are critical for developing neural circuits in the fetal brain. THC binding to these receptors can also influence the embryological differentiation of neural cells, disrupting embryogenesis and fetal development. The CB2 receptors have also been identified in the immune system, hema-

topoietic stem cells, and fetal astrocytes. They are important for pain relief and immunologic activity. Additionally, chronic THC use also disrupts folic acid uptake, with deficiencies known to cause neural tube defects. (5)

“In the newborn period, the hippocampus contains CB1 receptors that are neuroprotective and important for the newborn sucking reflex. Infants exposed to marijuana in utero are born with a lower birthweight and experience a wide array of clinical symptoms, including tremors, tachycardia, seizures, thermodynamic instability, uncoordinated suck-swallow reflex, tremors, irritability, and high-pitched crying.”

In the newborn period, the hippocampus contains CB1 receptors that are neuroprotective and important for the newborn sucking reflex. Infants exposed to marijuana in utero are born with a lower birthweight and experience a wide array of clinical symptoms, including tremors, tachycardia, seizures, thermodynamic instability, uncoordinated suck-swallow reflex, tremors, irritability, and high-pitched crying. Treatment is mainly directed at environmental and non-pharmacological interventions such as a dimly lit room with minimal sensory stimulation and maintained temperature stability. Interventions incorporate positional support with swaddling, gentle handling, skin-skin, and vertical rocking. Frequent small-volume feedings with higher calories are given, and the focus is placed on family-integrated neonatal care whenever possible. (5)

These same interventions are considered the standard of care, where we admitted and treated a premature baby boy born to a mother who tested positive for THC at the time of delivery. APGAR scores were 5,6 and 7 at the time of delivery, and the infant required intubation. The infant was THC-negative and delivered at 30.2 weeks via C-section secondary to preeclampsia. Steroids were administered alongside gentamycin and vancomycin as the mother had a history of urinary tract infection. He initially suffered from respiratory distress syndrome, hypoglycemia, hypermagnesemia, and hyperbilirubinemia, all of which resolved as time progressed. Despite these improvements, the infant became septic on day 19 of life, showing clinical signs of infection as he was bradycardic and fussy. Blood and urine cultures all came back negative. However, labs showed elevated white blood cells (WBC) and C-reactive protein (CRP), prompting the initiation of antibiotics. Although existing research states that there is no significant association between maternal cannabis and the development of hypoglycemia or sepsis, we know that CB2 receptors are important for

immunologic activity, promoting the question of whether or not prenatal exposure to marijuana contributed to this septic episode. The lack of association is likely due to a shortage of research studies, as there are many different physiologic explanations for this relationship. (8)

“THC is also stored in lipid predominate tissues like the brain, causing harm to the developing neural networks of the newborn brain. (5) A cross-sectional study performed at an urban academic hospital from 2018-2019 found that the majority of mothers were aware that marijuana use while breastfeeding may be harmful to infants, but a minority received counseling about the risks. (11)”

Although there is insufficient data surrounding whether maternal marijuana use during breastfeeding is safe, the American Academy of Pediatrics and the American College of Obstetrics and Gynecologists state that pregnant and breastfeeding people should not use marijuana. (9,10) It is estimated that the infant receives 2.5% of maternal THC dose through breastmilk, and THC is detectable for up to six days after reported use. (5) THC is also stored in lipid predominate tissues like the brain, causing harm to the developing neural networks of the newborn brain. (5) A cross-sectional study performed at an urban academic hospital from 2018-2019 found that the majority of mothers were aware that marijuana use while breastfeeding may be harmful to infants, but a minority received counseling about the risks. (11) This study emphasizes the critical need for patient education during the postnatal period, as it is a unique opportunity to intervene and provide meaningful impacts.

“In childhood and adolescence, prenatal exposure predicts challenges in executive function, such as memory and reasoning, and behavioral issues, such as hyperactivity and inattention, can persist into adulthood. In adolescents exposed to a suboptimal environment, they may even experience an increased risk for global cognitive impairment or delinquency. (12)”

In childhood and adolescence, prenatal exposure predicts challenges in executive function, such as memory and reasoning, and behavioral issues, such as hyperactivity and inattention, can per-

sist into adulthood. In adolescents exposed to a suboptimal environment, they may even experience an increased risk for global cognitive impairment or delinquency. (12)

As outlined above, marijuana exposure in utero is associated with lasting deleterious effects. Early targeted interventions with both mother and infant have the potential for profound lifelong impacts, as the pregnancy and postnatal period is a window of opportunity to provide the required help. (13) A multi-disciplinary team involving primary care physicians, obstetricians, social workers, pharmacists, and psychologists should work directly with the patient to provide needed care. (8) It is essential to begin the conversation prior to conception, as substance use behaviors typically develop before pregnancy, and preventive approaches to address cannabis use would provide significant benefit. (14) The postnatal period is also a stressful time, and families of infants exposed to drugs are disproportionately at risk for socioeconomic and social challenges. It is vital to connect parents to their social network and any mental health treatment they might need. (13) Providers within the NICU are faced with a unique opportunity for counseling and intervention, and patient education should become a routine standard of care for all cases of substance use. Exposure to marijuana during pregnancy places both the mother and infant at risk of adverse outcomes and providers have the power to end a cycle of harmful effects. (8)

“Beyond the bedside, it is up to our next generation of providers to research marijuana exposure further, as there is a significant gap in our knowledge. Much of the current evidence is derived from cohort or case-control studies, which face the potential for bias, and we must continue to expand our body of knowledge for the well-being of mothers and infants across the country.”

Beyond the bedside, it is up to our next generation of providers to research marijuana exposure further, as there is a significant gap in our knowledge. Much of the current evidence is derived from cohort or case-control studies, which face the potential for bias, and we must continue to expand our body of knowledge for the well-being of mothers and infants across the country.

References:

1. <https://www.ncsl.org/health/state-medical-cannabis-laws>
2. <https://www.usnews.com/news/best-states/articles/where-is-marijuana-legal-a-guide-to-marijuana-legalization>
3. Skelton KR, Young-Wolff KC. Preconception cannabis use: An important but overlooked public health issue. *Womens Health (Lond)*. 2022 Jan-Dec;18:17455057221124071. doi: 10.1177/17455057221124071. PMID: 36148938; PMCID: PMC9510968.
4. Grigsby TM, Hoffmann LM, Moss MJ. Marijuana Use and Potential Implications of Marijuana Legalization. *Pediatr Rev*. 2020 Feb;41(2):61-72. doi: 10.1542/pir.2018-0347.

PMID: 32005683.

5. Martin GI. Marijuana: the effects on pregnancy, the fetus, and the newborn. *J Perinatol.* 2020 Oct;40(10):1470-1476. doi: 10.1038/s41372-020-0708-z. Epub 2020 Jun 7. PMID: 32507859.
6. Roberson EK, Patrick WK, Hurwitz EL. Marijuana use and maternal experiences of severe nausea during pregnancy in Hawai'i. *Hawaii J Med Public Health.* 2014 Sep;73(9):283-7. PMID: 25285255; PMCID: PMC4174692.
7. Kim HG, Moon J, Dixon H, Tullar P. Recurrent Nausea and Vomiting in a Pregnant Woman with Chronic Marijuana Use. *Case Rep Obstet Gynecol.* 2018 Sep 16;2018:9746062. doi: 10.1155/2018/9746062. PMID: 30305971; PMCID: PMC6165623.
8. Shukla S, Doshi H. Marijuana and Maternal, Perinatal, and Neonatal Outcomes. 2023 Aug 14. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. PMID: 34033378.
9. Ryan SA, Ammerman SD, O'Connor ME; COMMITTEE ON SUBSTANCE USE AND PREVENTION; SECTION ON BREASTFEEDING. Marijuana Use During Pregnancy and Breastfeeding: Implications for Neonatal and Childhood Outcomes. *Pediatrics.* 2018 Sep;142(3):e20181889. doi: 10.1542/peds.2018-1889. Epub 2018 Aug 27. Erratum in: *Pediatrics.* 2018 Aug 27;: PMID: 30150209.
10. ACOG. Committee opinion #722. Marijuana use during pregnancy and lactation. *Obstetrics and Gynecology* 2017;130:e205-9.
11. Crowley HR, Goyal NK, Chung EK. Marijuana and Breastfeeding: A Pilot Survey of Mothers. *Hosp Pediatr.* 2022 Jul 1;12(7):e255-e260. doi: 10.1542/hpeds.2021-006420. PMID: 35642492.
12. McPherson C. Up in Smoke: The Impacts of Marijuana During Pregnancy. *Neonatal Netw.* 2023 Jul 1;42(4):222-232. doi: 10.1891/NN-2022-0040. PMID: 37491043.
13. Dinger J, Hinner P, Reichert J, Rüdiger M. Methamphetamine Consumption during Pregnancy - Effects on Child Health. *Pharmacopsychiatry.* 2017 May;50(3):107-113. doi: 10.1055/s-0042-122711. Epub 2017 Feb 8. PMID: 28178739.
14. Skelton KR, Young-Wolff KC. Preconception cannabis use: An important but overlooked public health issue. *Womens Health (Lond).* 2022 Jan-Dec;18:17455057221124071. doi: 10.1177/17455057221124071. PMID: 36148938; PMCID: PMC9510968.

Disclosure: The author has no conflicts of interests to disclose.

NT

Corresponding Author



Suha Godil
3rd Year Osteopathic Medical Student
College of Osteopathic Medicine of the Pacific
Western University of Health Sciences
Pomona, CA
Email: suha.godil@westernu.edu

Fellow's Column is published monthly.

- Submission guidelines for "Fellow's Column":
- 2000 word limit not including references or title page. Exceptions will be made on a case by case basis
- QI/QA work, case studies, or a poster from a scientific meeting may be submitted..
- Submission should be from a medical student, resident, fellow, or NNP in training.
- Topics may include Perinatology, Neonatology, and Younger Pediatric patients.
- No more than 20 references.
- Please send your submissions to:

Elba Fayard, MD, Interim Fellowship Column Editor
or Sandeep Lankireddy, OMS IV Fellowship Column Assistant
Editor: LomaLindaPublishingCompany@gmail.com