

Does marijuana use in pregnancy increase the risk for abnormal fetal biometrics on prenatal ultrasound?

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Background

- The rate of marijuana (MJ) use among pregnant patients has risen over the past decade.¹
- There is growing evidence to support that today's marijuana is more potent and consumed in higher quantities than the previous decade.²
- Studies have drawn mixed conclusions on whether maternal MJ use during pregnancy correlates to adverse fetal outcomes.³⁻⁵
- Fetal biometrics or measurements of fetal femur (FL), humerus (HL), biparietal diameter (BPD), head and abdominal circumferences (HC, AC) via ultrasound (US) can be used to calculate estimated fetal weight and monitor fetal growth.⁶

Objectives

To identify if there is an increased risk for abnormal fetal growth as determined by fetal biometrics on 2nd trimester US in fetuses exposed to MJ in-utero.

Methods

Study Design and Data Abstraction

- This is a retrospective cohort study of pregnant patients (pts) with urine drug screens (UDS) from Jan. 2012 to Dec. 2018.
- Cases included pts with positive MJ UDS while controls were identified by negative MJ UDS.
- Controls were matched to cases 1:1 on maternal age at delivery (18-25, 26-35, or >35), parity at entry into care, fetal sex, insurance status (private, income-dependent, and uninsured), and year of delivery (within 4 years of case delivery year).
- Excluded were pts <18 yo. at time of conception, multifetal pregnancies, deliveries outside the UHealth system, those missing a 2nd trimester US (defined as 16-27 weeks in this study), or US with missing FL, HL, BPD, HC, and or AC.

Statistical Methods

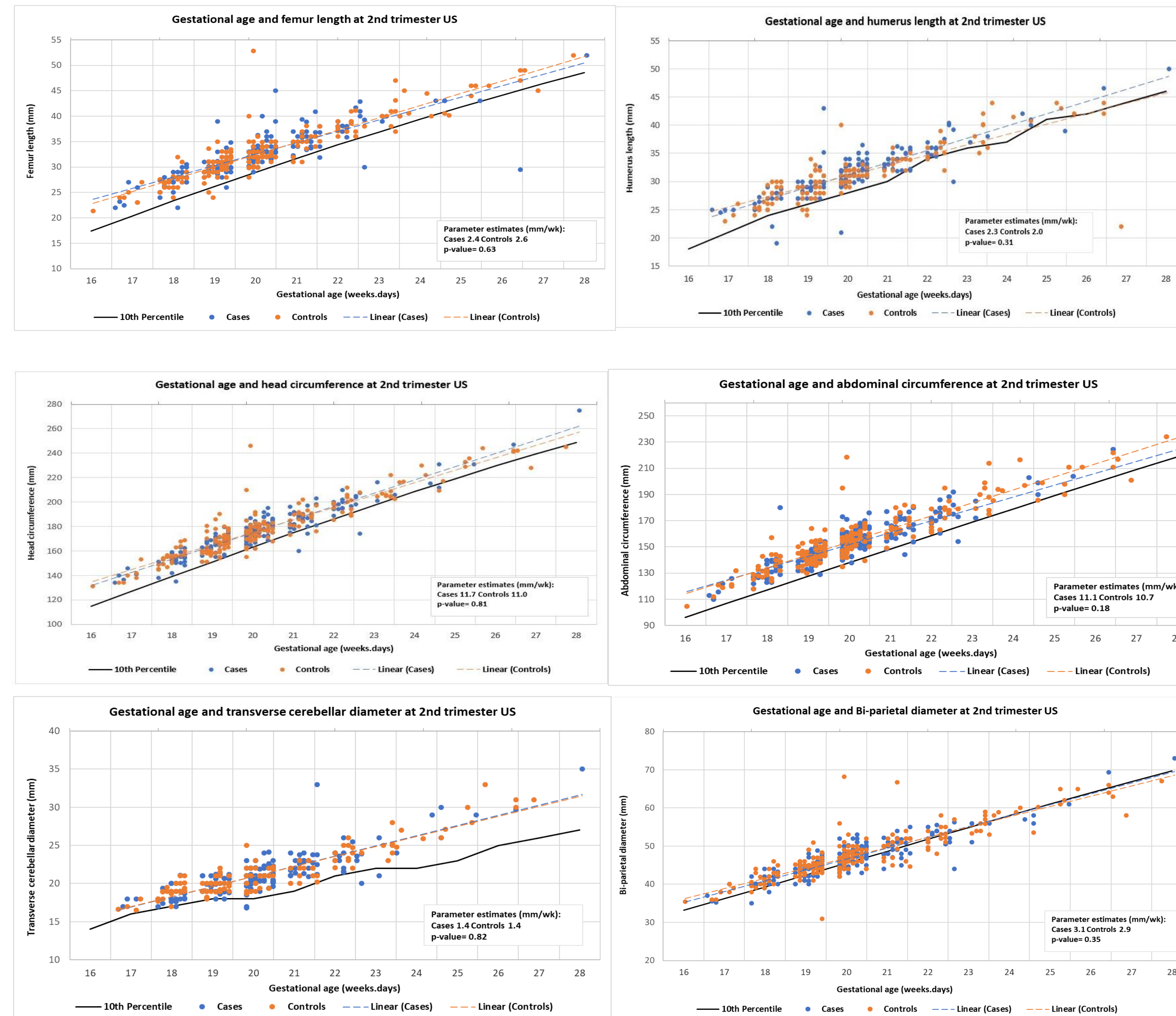
- The MJ exposed infants were compared to the control infants on all growth parameters (BPD, HC, AC, FL, EFW, and growth percentile) via Mann-Whitney U tests for continuous parameters, and Chi square or Fisher's exact tests for categorical parameters.
- In order to see a 5% difference in parameters we estimated a sample size of 200 cases and 200 controls (N=400) would be needed at a power of 90% and a p of <0.01.

Table 1:
Maternal Demographics and Growth Parameter Results

	Positive marijuana UDS in pregnancy n=202	Negative marijuana UDS in pregnancy n=202	P value
	n(%)	n(%)	
Maternal Characteristics			
Age			
18-25	98 (48.5)	96 (47.5)	0.98
26-35	95 (47.0)	97 (48.0)	
>35	9 (4.5)	9 (4.5)	
Parity			
Nulliparous at first prenatal visit	75 (37.1)	76 (37.6)	0.92
Multiparous at first prenatal visit	127 (62.9)	126 (62.4)	
Race/ethnicity			
Non-Hispanic White	116 (57.4)	116 (58.9)	0.08
Non-Hispanic Black	43 (21.3)	26 (12.9)	
Non-Hispanic Other	6 (2.9)	11 (5.4)	
Hispanic	37 (18.3)	46 (22.8)	
Baby Sex			
Male	95 (47.0)	94 (46.5)	0.92
Female	107 (52.9)	108 (53.5)	
Insurance			
Private	22 (10.9)	22 (10.9)	1
Public	177 (87.6)	177 (87.6)	
Uninsured/Red Carpet	3 (1.5)	3 (1.5)	
Delivery/Pregnancy End year			
2012-2013	9 (4.5)	24 (11.9)	<0.01
2014-2015	18 (8.9)	40 (19.8)	
2016-2017	73 (36.1)	100 (49.5)	
2018-2019	102 (50.5)	38 (18.8)	
Gestational age at entry into care	11.3 (8.3-17.0)	11.3 (8.3-16.3)	
Maternal pre-pregnancy weight (kg)	66.7 (58.1-80.5)	69.2 (58.1-83.9)	0.32
Maternal delivery weight (kg)	79.8 (67.1-94.3)	80.6 (69.0-93.7)	0.56
Comorbidities			
Pre-existing hypertension	10 (4.9)	13 (6.4)	0.52
Gestational hypertension	14 (6.9)	11 (5.4)	0.54
Preeclampsia	18 (8.9)	7 (3.5)	0.02
GDM	5 (2.5)	11 (5.4)	0.13
Hepatitis C	1 (0.5)	1 (0.5)	1
STI	12 (5.9)	10 (4.9)	0.66
Anxiety	46 (22.8)	36 (17.8)	0.22
Depression	77 (38.1)	50 (24.8)	<0.01
Obesity	10 (4.9)	4 (1.9)	0.17
Bipolar disorder	13 (6.4)	11 (5.4)	0.67
Medication use			
Prescription opioid use	8 (3.9)	4 (1.9)	0.38
MAT (Suboxone, Methadone, Subutex)	3 (1.5)	2 (1.0)	1
Substance use			
Self-reported MJ use in pregnancy	117 (57.9)	15 (7.4)	<0.01
MJ use prior to pregnancy	81 (40.1)	15 (7.4)	<0.01
Tobacco use in pregnancy	92 (45.5)	46 (22.8)	<0.01
Alcohol use in pregnancy	8 (3.9)	10 (4.9)	0.63
Opioid use in pregnancy	13 (6.4)	11 (5.5)	0.67
Methamphetamine use in pregnancy	4 (1.9)	8 (3.9)	0.38
Cocaine use in pregnancy	3 (1.5)	1 (0.5)	0.62

Results

Figures:
Ultrasound Biometrics for Cases and Controls by Gestational Age at Second Trimester Ultrasound



- There were no significant demographic differences between patients with and without a positive MJ UDS. Patients were generally < 35-years-old (95.5% vs 95.5%, p=0.98), multiparous (62.9% vs 62.4%, p=0.92), Non-Hispanic White (57.4% vs 58.9%, p=0.08) with public insurance (87.6% vs 87.6%, p=1.0) (Table 1).
- Among patients with a positive MJ UDS, there was a higher frequency of depression (38.1% vs 24.8%, p<0.01), self-reported tobacco use (46% vs 23%, p<0.01), and self-reported MJ use (58% vs 67%, p<0.01) (Table 1).

Conclusions

- There was no significant difference in neonatal outcomes or fetal biometrics on 2nd trimester US in infants exposed to MJ in-utero compared to infants without MJ exposure.
- Findings provide support for additional retrospective studies focused on quantifying maternal MJ use and timing of fetal exposure its impact on adverse fetal outcomes.

Limitations

- The sample was limited to patients who delivered in Colorado, with many of the patients having resided in the state through the duration of their pregnancy. These findings may ultimately not be generalizable to other populations outside of Colorado.
- In the medical charts, there was limited documentation regarding the timing, form (edible, inhaled, etc.) amount, and frequency of marijuana usage.

Disclosures

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References

- Volkow ND, Han B, Compton WM, McCance-Katz EF. Self-reported medical and nonmedical cannabis use among pregnant patients in the United States. JAMA. 2019;322(2):167-169. doi:10.1001/jama.2019.7982
- Mehmedic Z, Chandra S, Slade D, Denham H, Foster S, Patel AS, et al. Potency trends of Delta9-THC and other cannabinoids in confiscated cannabis preparations from 1993 to 2008. J Forensic Sci 2010;55:1209-17.
- Bailey BA, Wood, Shah D. Impact of pregnancy marijuana use on birth outcomes: Results from two matched population-based cohorts. Accepted, Obstetrics and Gynecology. J Perinatol. 2020 Mar 5; doi: 10.1038/s41372-020-0643-z.
- Crume TL, Juhl AL, Brooks-Russell A, Hall KE, Wymore E, Borgelt LM. Cannabis Use During the Perinatal Period in a State With Legalized Recreational and Medical Marijuana: The Association Between Maternal Characteristics, Breastfeeding Patterns, and Neonatal Outcomes. J Pediatr. 2018 Jun;197:90-96. doi: 10.1016/j.jpeds.2018.02.005. Epub 2018 Mar 28. PMID: 29605394.
- Frank DA, Bauchner H, Parker S., et al. Neonatal body proportionality and body composition after in utero exposure to cocaine and marijuana. Pediatrics 1990;117(4):622-626.
- March MI, Warsof SL, Chauhan SP. Fetal biometry: relevance in obstetrical practice. Clin Obstet Gynecol. 2012 Mar;55(1):281-7. doi: 10.1097/GRF.0b013e3182446e9b. PMID: 22343244.