Full length article

Marijuana use during and after pregnancy and association of prenatal use on birth outcomes: A population-based study

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ABSTRACT

Background: We sought to describe the correlates of marijuana use during and after pregnancy, and to examine the independent relationship between prenatal marijuana use and infant outcomes.
Study design: We used state-specific data from the Pregnancy Risk Assessment Monitoring System (N = 9013) to describe correlates of self-reported prenatal and postpartum marijuana use. We estimated differences in mean infant birth weight and gestational age among prenatal marijuana users and nonusers, controlling for relevant covariates (i.e., cigarette smoking).
Results: Respectively, 4.2% (95% CI: 3.8–4.7) and 6.8% (95% CI: 6.0–7.7) of women reported using marijuana during and after pregnancy. Compared to nonusers, prenatal marijuana users were more likely to be ≤ 24 years; non-Hispanic white, not married, have < 12 years of education, have Medicaid/IHS/Other insurance, be on WIC during pregnancy, have annual household income < $20,000, cigarette smokers, and alcohol drinkers during pregnancy (p-values < 0.05). After adjustment, no differences in gestational age or birthweight were observed. Postpartum users were more likely to smoke cigarettes (48.7% vs. 20.3%), experience postpartum depressive symptoms (14.0% vs. 9.0%), and breastfeed for < 8 weeks (34.9% vs. 18.1%).
Conclusion: Co-use of substances was common among prenatal and postpartum marijuana users. Prenatal marijuana use was not independently associated with lower average birthweight or gestational age. Postpartum marijuana use was associated with depressive symptoms and shorter breastfeeding duration. Surveillance of marijuana use among pregnant and postpartum women is critical to better understanding the relationship of marijuana use with birth outcomes, and postpartum experiences such as depression and breastfeeding.

1. Introduction

Marijuana is the most commonly used federal-prohibited drug in the U.S (Ebrahim and Gfroerer, 2003). However, as of November 2017, marijuana is legalized in 29 states and the District of Columbia (D.C.) for medical use and 8 states and D.C. for recreational use (Governing, 2018). Nationally, 4% of pregnant women reported using marijuana in the past month (Ko et al., 2015). Pregnant women who reported using marijuana commonly report alcohol and tobacco use (Ko et al., 2015). Although many studies have examined the association of marijuana use during pregnancy and adverse outcomes, older studies have uncontrolled confounding, and definitive evidence from contemporary studies is limited for a causal association between marijuana use during

pregnancy and adverse infant outcomes (Conner et al., 2016; English et al., 1997; Mark et al., 2016; Metz and Stickrath, 2015; National Academies of Sciences, Engineering, and Medicine, 2017; van Gelder et al., 2010). Marijuana use during pregnancy has been associated with low birthweight (Gunn et al., 2016; Hatch and Bracken, 1986; Hayatbakhsh et al., 2012; Zuckerman et al., 1989), preterm birth (Hatch and Bracken, 1986; Hayatbakhsh et al., 2012), shorter infant length at birth (Zuckerman et al., 1989), small for gestational age (Warshak et al., 2015), and admission to a neonatal intensive care unit (NICU) (Gunn et al., 2016; Hayatbakhsh et al., 2012; Warshak et al., 2015). Less is known regarding the prevalence of postpartum marijuana use and association with postpartum depression, and breastfeeding experiences (National Academies of Sciences, Engineering, and

Medicine, 2017).

As more states legalize medical or recreational marijuana and access to marijuana increases (Azofeifa et al., 2016; Brown et al., 2017), there is a need to understand the extent that women use marijuana during and after pregnancy and correlates of use. We also sought to evaluate the relationship between marijuana use and birth outcomes with a recent population-based sample of women. The study objectives were: 1) to describe the socio-demographic and health care utilization characteristics of women who use marijuana during pregnancy; 2) to evaluate the relationship between marijuana use during pregnancy with low birth weight and preterm birth; and 3) describe the socio-demographic characteristics of women who use marijuana postpartum and associations of use with postpartum depression and breastfeeding.

2. Materials and methods

We analyzed data from the Pregnancy Risk Assessment Monitoring System (PRAMS), an on-going population-based surveillance system conducted by state and city (NYC) health departments in collaboration with the Centers for Disease Control and Prevention (CDC). In addition to linking to birth certificate information, PRAMS collects data on maternal experiences and behaviors before, during, and after pregnancy among women who delivered a live-born infant. In each participating site, birth certificates are used to select a stratified sample of recent mothers. Women are mailed a questionnaire from 2 to 9 months after delivery, and those who do not respond to repeated mailings are contacted by telephone. Detailed information about sampling and survey methodology can be found at www.cdc.gov/PRAMS. The PRAMS protocol was approved by the Centers for Disease Control and Prevention's Institutional Review Board, and participating sites approved the study analysis plan.

Data on marijuana use is collected optionally by participating PRAMS states. During 2009–2011, three states (Alaska, Hawaii, and Vermont) and two states (Alaska and Vermont) collected optional information, respectively, on prenatal and postpartum marijuana use for at least two years. Each state included in the analyses met annual response rate thresholds of 65%.

At the time of data collection, medical marijuana was legal in all three states, but recreational marijuana was not.

A total of 10,067 live births had information on maternal prenatal marijuana use. The sample was further restricted to singleton births and infants without birth defects who had complete information on birthweight and gestational age, yielding a final sample size of 9013 live births for analysis of prenatal marijuana use. As only Alaska and Vermont collected postpartum marijuana use data, only 5466 live births had postpartum marijuana use information. After applying the same restrictions (singleton births, infants without birth defects who had complete information on birthweight and gestational age), the final sample size for postpartum analyses was 4969 births.

2.1. Measures

2.1.1. Marijuana use

Marijuana use during pregnancy was defined as an affirmative response to smoking or using marijuana or hash during pregnancy. Postpartum marijuana use was defined as an affirmative response to smoking marijuana or hash since the new baby was born (available for Alaska and Vermont only). State-specific questions of marijuana use are available in Appendix Table 1.

2.1.2. Birth outcomes and healthcare utilization

Infant birth weight in grams and gestational age in weeks using the clinical estimate were obtained from the birth certificate. Mean infant birthweight and gestational age were calculated and also categorized into low (< 2500 g) and normal (≥ 2500 g) birthweight and preterm (< 37 weeks) and term (≥ 37 weeks) births. NICU stay (yes/no) was assessed with the PRAMS question, "After your baby was born, was he or she put in an intensive care unit?" Length of hospital stay among infants admitted to the NICU (< 1–2 days, 3–5 days, 6–14 days, and 14 + days) was assessed with the question, "After your baby was born, how long did he or she stay in the hospital?" Attendance at the 1-week infant check-up (yes/no) was assessed among infants with birth hospitalizations ≤ 5 days in length with the question, "Was your new baby seen by a doctor, nurse, or other health care worker for a one-week check-up after he or she was born?"

2.1.3. Socio-demographic and other characteristics

Data source of demographic variables was chosen based on validity studies (Dietz et al., 2014; Dietz et al., 2015); in certain instances, data from both sources were used to minimize missing responses. Maternal age, race/ethnicity, marital status, and education were obtained from the birth certificate only. Insurance during pregnancy and annual household income were obtained from the PRAMS questionnaire only. Number of previous live births was determined from PRAMS and if missing, from the birth certificate. Participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) during pregnancy and trimester entry into prenatal care were obtained from the PRAMS questionnaire (Hawaii and Alaska) and from either birth certificate or the PRAMS questionnaire (for Vermont only, as they implemented the 2003 birth certificate revision). Pregnancies were categorized as intended (if women self-reported that they wanted to be pregnant sooner or then) or unintended (if women self-reported that they wanted to be pregnant later or that they didn't want to be pregnant then or at any time in the future) from the PRAMS questionnaire. Self-reported stressful life events in the year before delivery were tallied and categorized none, 1–2, 3–5, and 6–13 (hospitalized family member, separation/divorce, moved, homeless, partner or respondent lost job, argued with partner more often, partner did not want pregnancy, bills that could not be paid, physical fight, partner or respondent went to jail, someone close had drinking or drug problem, someone close died). Women were categorized as binge drinkers if they self-reported having four or more alcoholic beverages in one sitting (defined as a two-hour time span) on at least one occasion during the last 3 months of pregnancy; drinkers if they indicated any amount of drinking during the last 3 months of pregnancy but not binge drinking; and non-drinkers if they did not drink during the last 3 months of pregnancy. Smoking during pregnancy was defined as self-report of smoking during the last three months of pregnancy if noted on either the PRAMS questionnaire or from report of smoking during pregnancy from the birth certificate. Physical abuse in the 12 months before pregnancy and during pregnancy, postpartum smoking, postpartum depressive symptoms, and duration of breastfeeding were obtained from the PRAMS questionnaire. Women who answered yes to "During the 12 months before you got pregnant with your new baby, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?" and/or "During your most recent pregnancy, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?" were categorized as experiencing physical abuse before, during, or in both time periods. Postpartum smoking was categorized by the number of cigarettes smoked daily after pregnancy. Responses to feeling down, depressed, or sad; hopeless; or slowed down by a substantial degree after childbirth were summed (never = 1; rarely = 2; sometimes = 3; often = 4; always = 5) and categorized as having (sum of 10–15) or not having (sum of < 10) postpartum depressive symptoms. Breastfeeding was categorized into never; < 8 weeks; and ≥ 8 weeks obtained from the PRAMS questionnaire.

2.2. Statistical analysis

Prevalence of marijuana use during pregnancy and postpartum were estimated. Chi-square tests were conducted to assess the differential distribution of socio-demographic, alcohol and tobacco use, and health