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A Systematic Study on the Prevalence of Alcohol and Marijuana use in Pregnant Women with Opioid Use Disorder

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Abstract

Approximately 25% of pregnant women drink alcohol, 7.4 out of 1000 deliveries are affected by opioid use disorder (OUD), and cannabis use is on the rise among pregnant women. Despite this, there is little information about marijuana co-exposure in women who use multiple substances. Using the well-characterized ENRICH-1 cohort, which studied the effects of two primary exposures of interest-opioids and alcohol-the authors estimated the prevalence of marijuana use in those with OUD and or alcohol use and also examined correlates of marijuana use in those with OUD and or alcohol use. There were 194 participants with OUD, 100 with alcohol, and 94 with both OUD and alcohol. Based on self-reports and biomarkers, substance abuse was determined. The correlation between marijuana uses and multivariate logistic regression was identified. According to the OUD, OUD + alcohol, and alcohol groups, 46%, 52%, and 49% of pregnant women used marijuana. 20%, 22%, and 26% of participants reported weekly or daily use. Compared to women who took methadone (38%), those who took buprenorphine (46% and 60%, respectively) were significantly more likely to use marijuana. Marijuana users were generally younger than non-marijuana users in all three groups. There was a significant association between maternal age, and polysubstance use independent of group, race/ethnicity, education, and smoking. It was found that there was a significant interaction between partnership status and group: women in the OUD and OUD + alcohol groups had lower odds of marijuana use than those in the alcohol group. Women in the alcohol group who were partners had lower odds of using marijuana than women who were unpartnered. The authors conclude that women who are treated for OUD during pregnancy and or who consume alcohol during pregnancy are more likely to use marijuana. As a result of these findings, ongoing risk reduction strategies are needed for pregnant women receiving OUD treatment as well as pregnant women exposed to alcohol.

Keywords: Opioids, Pregnancy, Alcohol, Marijuana, Women

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Introduction

People across the lifespan have been affected by the opioid epidemic in USA, including pregnant women and newborns. Pregnant women enrolled in Medicaid in 2023 used prescription opioids during pregnancy at a rate of 31.2% [1, 2]. According to recent studies, more than 8% of pregnant women used opioids for non-medical reasons during pregnancy. 7.4 /1000 deliveries are affected by OUD in pregnant women, an increase of 400% between 2010 and 2023 [3]. It is estimated that OUD is more prevalent in some states than in others, such as West Virginia and Vermont, and in New Mexico the rate is 18.3/1000. Prenatal opioid exposure has been linked to intrauterine growth restriction, preterm delivery, and stillbirth in numerous studies [4]. In terms of long-term neurodevelopmental outcomes, it is unclear whether prenatal opioid exposure, medications for OUD (MOUD), neonatal opioid withdrawal syndrome (NOWS), and/or treatment for NOWS are related to poor outcomes or whether adverse pre- and postnatal environmental factors are primarily responsible [5]. The risk of unplanned healthcare utilization among infants with NOWS during their first year of life has been demonstrated by a recent study [6]. It is important to take into account the effects of polydrug use, such as co-exposure with marijuana, alcohol, stimulants, or other substances, when assessing obstetric and neonatal outcomes [7, 8]. Alcohol and tobacco are among the most common co-exposures that adversely affect the offspring's neurodevelopment. The prevalence of binge drinking, and tobacco use in pregnant women with OUD has been shown to be almost 31% and 90%, respectively. In addition, emerging evidence indicates prenatal marijuana exposure may be associated with adverse perinatal outcomes, including preterm birth, growth restriction, and increased neonatal intensive care unit admissions [9-11]. There was no significant association between marijuana use in the third trimester and adverse perinatal outcomes found in a retrospective cohort study of 191 mothers and infants exposed to buprenorphine during pregnancy, but marijuana co-exposure was associated with more severe NOWS [12, 13].

There has been an increase in the use of medical marijuana and legalization of recreational marijuana among women of reproductive age. Between 2010 and 2023, the National Survey on Drug Use and Health (NSDUH) reported significant increases in marijuana use among pregnant and non-pregnant women of reproductive age [14]. There was a significant increase in marijuana use during the first trimester of pregnancy. Pregnant women receiving prenatal care at showed a 5% increase in marijuana use between 2010 and 2023 in a cross-sectional study [15-18]. Over time, both studies also found a significant increase in usage frequency. Moreover, pregnant women in states that legalized medical

marijuana were four times more likely to be admitted to substance abuse treatment programs for marijuana use [19]. Marijuana use is not well characterized among pregnant women receiving care for OUD or other substances, including alcohol [2, 20]. Using data collected from pregnant women in a well-characterized cohort exposed to MOUD and alcohol as primary exposure, we conducted a secondary analysis: to estimate the prevalence and frequency of marijuana use in people exposed to alcohol, and also to examine the correlates of marijuana use [21-26]. On the basis of existing literature, we hypothesized that marijuana use would be higher among pregnant women who used opioids or alcohol during pregnancy than in the general obstetric population as a whole. Self-reports and urinalysis will provide comparable estimates of marijuana use; younger women will have a higher prevalence. Using secondary data collected from pregnant women exposed to MOUD and alcohol, the following objectives were met: to estimate the prevalence and frequency of marijuana use (by self-report and urine drug testing) among those exposed to alcohol or OUD, and also to examine correlates of marijuana use. Due to the literature available, the authors hypothesized marijuana use would be more prevalent among pregnant women who used opioids and/or alcohol during pregnancy than the national estimates from the general population; prevalence estimates will be comparable between self-report and urine analysis and younger women will have a higher prevalence rate [27-30] (Figure 1).

Methods of Study Design and Selection Criteria of Population

Data were obtained from the different cohort studies published on scientific repositories like PubMed, PMC, and other journals. The study evaluated prenatal substance use through four prospective visits: a baseline prenatal visit, labor and delivery hospitalization, 8 months postpartum, and 24 months postpartum. Women with substance use disorders (SUD) were recruited from general prenatal care clinics and the Milagro clinic, which specializes in prenatal care for women with SUD [32-36]. Among the eligibility criteria were: A mother who is 18 years old, the pregnancy was a singleton, the gestational age at enrollment was 14 - 35 weeks; and the ability to provide written consent in English [37]. Among the exclusion criteria were a fetal diagnosis of a major structural anomaly, a habit of using cocaine, crack cocaine, methamphetamines, more than occasionally and self-report of using these substances during the first trimester [38]. All the studies were approved and all participants on different studies seemed to sign an informed consent form as per the guidelines of human research review committee [39-41]. Participants were divided into three groups according to their primary exposures at the baseline visit: alcohol, OUD, and in a few cases both alcohol and OUD. Due to the absence of alcohol use in the cohort, unexposed controls were excluded from this analysis. A diagnosis of alcohol use disorder was not defined for women enrolled in the cohort study classified as the alcohol group [42-44]. A general obstetrics population was evaluated to determine if they scored 2 on screening questionnaire, consumed at least four drinks per week on average between their last menstrual period and pregnancy recognition, or they had 2 - 3 binge episodes (six drinks/occasion) during the same period [45]. In most of the studies, maternal ethanol biomarkers were used to assess the use of alcohol during pregnancy, as well as self-reports [46]. Most of the studies converted the amount and frequency of alcohol reported on each day into ounces of absolute alcohol per day. Moreover, basic 4 - 5 ethanol biomarkers in maternal blood and urine collected at baseline [47-49]. The use of substances, including marijuana, was determined by self-report and urine cannabinoid biomarkers (carboxy-THC). Women who reported using stimulants, benzodiazepines, sedatives, prescription medications or hallucinogens were considered polysubstance users. Further, a urine drug screen (UDS)-7 panel was collected and analyzed at the US, including amphetamines, barbiturates, benzodiazepines, cocaine, opioids, phencyclidine (PCP), cannabinoids and tetrahydrocannabinols, along with nicotine metabolites (nicotine, cotinine, 3-hydroxycotinine, nornicotine, and anabasine). Tests for drugs (Des Plaines, IL). Any self-reported marijuana uses between LMP and study enrollment, or a positive UDS result at baseline, was considered marijuana use. Prevalence estimates for marijuana were based on the non-missing value if either self-reports or UDS results were missing. The values of neither participant were missing [50] (Figure 2).

Descriptive statistics were used to summarize participant characteristics and co-exposures. Using independent two-sample tests of means, marijuana use, and non-use groups were compared using a t test for normally distributed and non-normally distributed data, respectively [52]. Fisher's exact tests were used to determine whether categorical variables differed between the two groups. An independent logistic re-

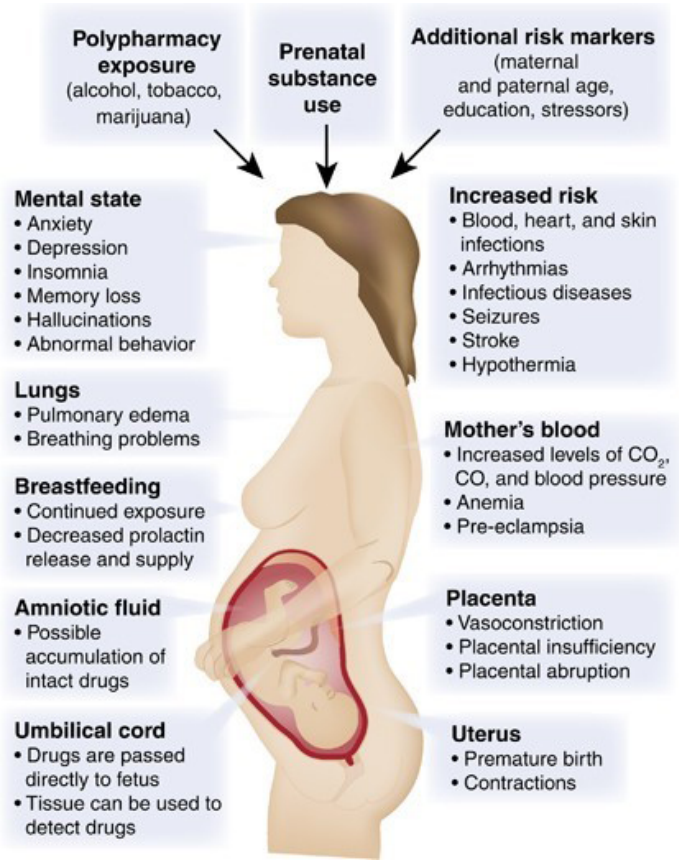

Figure 1: Consequences of fetal exposure to drugs, alcohol, and marijuana [31].

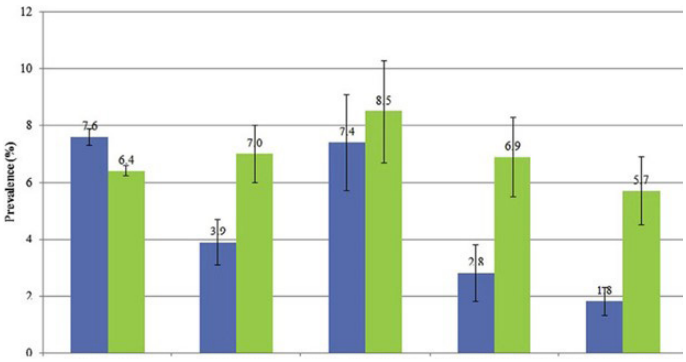

Figure 1: Comparison of patterns of marijuana use among pregnant and non-pregnant woman [51].

gression model including group, characteristic, and an interaction between the two was fitted to the data to compare marijuana use between the three exposure groups [53-56]. Using the interaction terms from these models, we assessed differences in marijuana use between groups according to their demographic characteristics. Marijuana use was studied using a multivariable logistic regression model including group as an independent variable and other covariates that were associated with marijuana use in bivariate analyses, as well as those hypothesized to be associated a priori (such as using other drugs), as well as known or potential confounders [57-60]. Several interactions have been added to the model based on findings of differential effects of marijuana use across groups in previous analyses of characteristics and co-exposures. SAS was used to perform all statistical analyses [61-63].

Results

Women accounted for 64% of the sample, while American Indian women accounted for 4%. Medicaid accounted for 79% of participants. As a whole, 48% of the population reported using marijuana. In terms of gestational age, partnership status, Hispanic ethnicity, race, educational level, employment status, or type of medical insurance, marijuana users and non-users did not differ at enrollment [64]. There was a significant difference in the age of marijuana users, the use of other substances, and the use of alcohol during early pregnancy compared to non-users. Marijuana users had a higher prevalence of stimulants, benzodiazines, sedatives, and tobacco than non-users. Neither marijuana users nor non-users reported using heroin, opioid analgesics, nor opiates detected only by UDS [65]. There were 2 positive urine screen results among 119 women who denied using marijuana, and 46 negative urine screen results among total women who reported using marijuana. In addition, there were two participants who did not provide self-reports and nine participants who did not provide urine results. A study of women with OUD found that 40% reported using marijuana (compared to 51% in the group with OUD and alcohol and 49% in the group with alcohol). Women with OUD and alcohol were more likely than those with OUD to use marijuana weekly. In this study, marijuana use prevalence is compared among the three study groups by sociodemographic characteristics [66]. With the exception of partnership status, there was no difference in marijuana use between groups based on sociodemographic characteristics. It was found that marijuana use was significantly influenced by study group and partnership status: the most marijuana users were in the alcohol group, with 83% of un-partnered women reporting marijuana use, compared to 35% of partnered women [67].

Among the three groups, MOUD and other substance users are most likely to use marijuana. In the OUD and OUD + alcohol groups, 98% of the women used methadone or buprenorphine as prescribed. Over half (57%) of women prescribed buprenorphine in the OUD + alcohol group used marijuana, compared to less than half (43%) in the OUD group. Polysubstance users reported using marijuana more often than nonpolydrug users in all three groups (55.6%, 58.6%, and 58.8%, respectively) compared to nonpolydrug users. The interaction between heroin use in the OUD + alcohol group and marijuana use in the OUD group was not significant, although a higher proportion of women using heroin in the OUD + alcohol group used marijuana. All groups were controlled by study group, ethnicity, race, education level, and tobacco use during pregnancy. Independent correlates of marijuana use included maternal age and polysubstance use compared to women exposed to polysubstance during pregnancy. As a result of multivariable analyses, the interaction between partnership status and group remained significant [68, 69]. Alcohol group participants had significantly lower odds of using marijuana than those in the OUD or OUD + alcohol groups. For partnered women in the alcohol only group is 85% lower than that for unpartnered women.

Discussion

In this study, more than 47% of pregnant women in treatment for OUD with or without concurrent alcohol consumption used marijuana early in pregnancy. These estimates are significantly higher than recent 2023 estimates of marijuana use in pregnant and non-pregnant women in the general population surveyed. Women who are pregnant or parenting were examined in California, Illinois states for the effect of marijuana legalization on alcohol and drug use. A three-year program for women who used alcohol or drugs during pregnancy served as the subjects, and the study found women leaving the program in the post-legalization period were twice as likely to report using marijuana in the 30 days before exiting as women exiting the program before legalization. The likelihood that women would continue to use after legalization was twice as high. Pregnant women may perceive low risks associated with increased marijuana use. It is common for women to hold contradictory views about marijuana during pregnancy: on the one hand, attempting to decrease their consumption when they become pregnant; on the other hand, believing that marijuana is safe, 'natural,' and that it can reduce nausea and vomiting. Women report that non-medical and medical sources provide them with information about marijuana use. It is also believed by some women with OUD that marijuana may help manage withdrawal symptoms and opioid dependence. The prevalence of marijuana use among pregnant women with OUD and some alcohol use in this study was twice as high as among people with chronic medical conditions According to the study, 29% of those aged 17 - 35 with any chronic illness reported marijuana use, while 15% did not. It is generally accepted that marijuana use during pregnancy is somewhat or completely safe among people with and without medical conditions. In a national online survey, 9% of adult respondents agreed that marijuana use during pregnancy is somewhat or completely safe [70].

Considering the lack of studies demonstrating the safety of marijuana in pregnancy, it is particularly concerning that a substantial proportion of women use marijuana almost daily, compared to patients who use it once a week or less. Women in the alcohol group reported light-to-moderate/intermittent alcohol consumption during pregnancy. Interestingly, maternal self-reports showed a higher prevalence estimate than urinalysis. There is a shorter detection window on urinalysis when compared to the reporting timeframe. THC elimination in the urine is influenced by a number of factors, such as the quantity and frequency of marijuana use, creatinine levels, body mass index, and individual differences in metabolism. After three days of abstinence, THC concentrations typically decrease rapidly [56]. However, subjects with high exposure levels may have detectable THC levels for several weeks. As opposed to biomarkers, self-reported measures offer the advantage of being noninvasive and allowing evaluation over a longer period of time. Depending on the setting, population, and interviewer characteristics, self-reported drug use can be valid or invalid. There are high levels of validity for self-reported marijuana use, as well as high levels of validity for self-reported opioid use (sensitivity 97%) in drug treatment settings. In our previous research, we found that pregnant women in substance abuse treatment programs underreport substance use, except for opioids and marijuana. As a result, methadone had a sensitivity of 98%, buprenorphine had an 85% sensitivity, other opioids had 60% sensitivity, and marijuana had 60% sensitivity. Our review found independent associations between younger maternal age, using other substances, and partnership status and marijuana use. When compared with women who only consumed alcohol during pregnancy, unpartnered women with OUD were less likely to use marijuana. The odds of using marijuana were higher for women with both a history of

OUD and alcohol use than for those who had used alcohol alone among women who were partnered. A few studies have examined marijuana use among pregnant women who have used other substances; however, our findings differ from those of other pregnant women studies, where married women are less likely to use marijuana or opioids than unpartnered women (unmarried, divorced, separated, or widowed). There may be differences in marijuana use by marital status due to recreational, medical, or accessibility reasons. Women in our study reported using polysubstance at a high prevalence which is in line with other studies. Marijuana use was over twice as likely among women who reported polysubstance use as among women who did not report polysubstance use. Among all women, concomitant tobacco use was especially high, as were concomitant marijuana use and estimated alcohol consumption. The most common co-exposures among pregnant women in substance abuse treatment were alcohol and marijuana. Pregnant women are more likely to use polysubstance than non-pregnant women. The risk of growth deficiencies was substantially higher among polydrug users than among abstinent controls, according to our previous study. Buprenorphine-exposed neonates were also found to have severe NOWS in the presence of polysubstance exposure [38].

A number of limitations should be considered when interpreting the results of this analysis. In spite of the large sample size (119 participants), this study cannot generalize its results to all pregnant women who use substances during pregnancy, since patients were recruited from a multidisciplinary prenatal clinic at UNM that focused on SUD. It is further unlikely that these results can be generalized to patients without MOUD for OUD, since they may be even more likely to use marijuana than OUD patients with MOUD. Secondly, we were unable to assess secular trends in marijuana use. Therefore, most data were obtained prior to 2023. Finally, we acknowledge that the OUD + alcohol group and the alcohol group were relatively small, resulting in limited generalizability to different alcohol consumption patterns, such as those experienced by women with alcohol use disorders [71]. With repeated prospective interviews and a comprehensive battery of alcohol, tobacco, and illicit drug biomarkers, the study has the strength of a prospective cohort design and state-of-the-art characterization of prenatal substance use. In future studies, marijuana use should be specifically examined in pregnant women who use opioid analgesics chronically and those who have OUD who do not receive methadone or buprenorphine. Pregnant women who report marijuana use should be counseled about potential adverse health consequences of continued use during pregnancy, according to the American College of Obstetricians and Gynecologists (ACOG). They should be encouraged to stop using marijuana. It is unclear whether marijuana use directly affects the developing brain (based on restricted access to marijuana for research studies), but cannabinoid receptors are located all over the brain, and scant research indicates that cannabinoid exposure alters brain function in a broad manner. With the legalization of marijuana becoming more widespread and the percentage of THC in marijuana products increasing, more information about the effects of prenatal marijuana exposure will be needed. As well as recommending alternative therapeutic approaches with better pregnancy-specific safety data, ACOG also recommends avoiding medical marijuana during pregnancy [72]. In addition, the American Academy of Pediatrics (AAP) cautions against smoking marijuana or other cannabinoid-containing products during pregnancy, whether for recreational purposes or medical reasons. Screening, brief interventions, and treatment referrals are recommended by the AAP. If a woman is trying to conceive, pregnant, or breastfeeding, ACOG, AAP, and the surgeon general recommend abstaining from marijuana use completely. The knowledge and research gap remains substantial, however. Unlike abstinence from cigarettes and alcohol, there is no substantial evidence that abstinence from marijuana will decrease negative perinatal/pediatric outcomes. Nevertheless, harm reduction approaches should consider the high proportion of women who use drugs almost every day as part of their approach [73, 74].

Conclusion

Pregnant women who receive MOUD and do not abstain from alcohol during pregnancy are more likely to use marijuana regularly than those who do not. As a result of the risk of polysubstance use to both the mother and fetus, our findings are concerning. It is necessary to conduct further research and evaluate programs aimed at reducing marijuana use by pregnant women, especially those with alcohol dependency or OUD.

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None.

Conflict of Interest

None.

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