Pregnant Women's Current and Intended Cannabis Use in Relation to Their Views Toward Legalization and Knowledge of Potential Harm

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Objectives: The objective of this study was to investigate pregnant women's current use of cannabis and their intended patterns of use with relation to their views on the legalization of cannabis and their knowledge of potential harms.

Methods: A voluntary, anonymous survey regarding patterns of use of cannabis and views on legalization was distributed to a convenience sample of pregnant women presenting for prenatal care at an outpatient university clinic. Chi-square and Fischer's exact tests were used for analysis using STATA.

Results: Of 306 surveys returned, 35% of women reported currently using cannabis at the time of diagnosis of pregnancy and 34% of those women continued to use. Seventy percent of respondents endorsed the belief that cannabis could be harmful to a pregnancy. Fifty-nine percent of respondents believed that cannabis should be legalized in some form and 10% reported that they would use cannabis more during pregnancy if it were legalized. Those who continued to use cannabis during pregnancy were less likely than those who quit to believe that cannabis use could be harmful during pregnancy (26% vs 75%, $P < 0.001$). The most common motivation for quitting cannabis use in pregnancy was to avoid being a bad example (74%); in comparison, only 27% of respondents listed a doctor's recommendation as a motivation to quit.

Conclusions: Cannabis use during pregnancy is relatively common and persistent, despite knowledge of the potential risks of harm. Views toward legalization vary among pregnant women and may impact cannabis use during pregnancy. In a changing legal climate, there is a need for clear messaging on the effects of cannabis use during pregnancy.

Key Words: cannabis, legalization, marijuana, pregnancy

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In 2013, 5.7 million people in the United States older than the age of 12 used cannabis on a daily or almost daily basis (Hedden et al., 2015). Twenty-three states and the District of Columbia have legalized medical cannabis and decriminalized possession and use of cannabis, whereas 4 states and the District of Columbia have legalized its recreational use (Ammerman and Tau, 2016). Research has shown that states with legalized medical cannabis had significantly higher rates of cannabis use (Cerdá et al., 2012), although other analyses suggest the relationship may not be causal (Harper et al., 2012). Although the cause-and-effect relationship between liberalization of cannabis laws and use is unclear, it is likely that the overall trend of greater social acceptance of cannabis contributes to both higher rates of use and drives momentum for liberalizing cannabis statutes in state legislatures. In a nationally representative survey of high school seniors, 10% of teenagers who had never used cannabis reported that they would begin using if it were legalized, and 18% of those who currently used reported that they would increase their use (Palamar et al., 2014).

Cannabis is the most frequently used illicit drug in pregnant women, accounting for approximately 75% of all illicit drug use during pregnancy (Ebrahim and Gfroerer, 2003). According to the National Survey on Drug Use and Health (Hedden et al., 2015), 3.9% of pregnant women reported being current cannabis smokers, and 18.1% of pregnant cannabis smokers met criteria for abuse or dependence (Ko et al., 2015). Although there is no universal agreement regarding the precise implications of cannabis use during pregnancy, preclinical, and observational longitudinal studies have shown detectable harmful outcomes for neonates (Marroun et al., 2009; Goldschmidt et al., 2012; Trezza et al., 2012; Huizink, 2014). These outcomes, which span physical and behavioral domains, include reduced fetal growth, reduced birth weight, altered emotional reactivity, increased ultrasonic vocalizations (a sign of distress and anxiety), depressive symptoms, and impaired memory functioning (Huizink and Mulder, 2006; Marroun et al., 2009; Goldschmidt et al., 2012; Trezza et al., 2012). Prenatal exposure to cannabis may also have implications for development and neurological functioning over the longer term (Fried and Smith, 2001; Fried et al., 2003). Many, though not all, women do decrease or quit using cannabis at some point during their pregnancy (Ebrahim and Gfroerer, 2003;

Forray et al., 2015; Mark et al., 2015), but the rates of returning to cannabis use postpartum are as high as 70% (Forray et al., 2015).

Questions remain about the factors that motivate women to quit cannabis use during pregnancy, and how these may be related to the likelihood of post-partum relapse. Various motivations for quitting cannabis have been shown to be associated with rates of relapse (Chauchard et al., 2013). In a sample of non-pregnant patients, respondents who stopped using cannabis for reasons related to social or legal factors were less likely to relapse than those who quit for self-image, self-control, self-efficacy, relationship, or health concerns (Chauchard et al., 2013).

This study evaluates pregnant women's patterns of cannabis use, views toward legalization, knowledge of potential harms, and motivations for cessation during and after pregnancy. Understanding pregnant women's specific motivations for cannabis use and cessation in pregnancy may guide providers to focus their counseling efforts, illuminate unintended consequences of legalization and help to identify those women who are at risk for relapse postpartum despite stopping cannabis use during pregnancy.

METHODS

This study was a cross-sectional survey conducted among pregnant women to evaluate their patterns of cannabis use during pregnancy and their attitudes toward legalization of cannabis with relation to knowledge of potential harms. The survey was administered at an Outpatient Obstetrics and Gynecology Clinic at the University of Maryland Medical Center in Baltimore, Maryland, between June 2015 and January 2016. The study population consisted of a clinical convenience sample of 306 unique pregnant women attending a prenatal visit. Study procedures were approved by the University of Maryland institutional review board.

Pregnant women were approached at the prenatal clinic by a member of the study team and asked to complete a brief, voluntary, and anonymous survey regarding of use and views on cannabis. Inclusion criteria included pregnancy and ability to read English. A private space was provided to complete the survey. The respondents returned the survey in a sealed envelope to a member of the research team. All surveys that were returned were included in the analysis, and any unanswered survey items were treated as missing. After completion of the survey, all respondents received information regarding the health implications of cannabis use during pregnancy.

The survey included demographic information and 26 items regarding respondents' frequency and quantity of cannabis use before and during pregnancy, intentions to use during the remainder of their pregnancy and postpartum, as well as their possible motivations to quit for those respondents who indicated that they had quit or intended to quit (Table 1). The survey items were modeled after a previously reported survey by Chauchard et al. (2013) that evaluated motivations for quitting cannabis in a non-pregnant population. The survey items were modified by the authors to apply to pregnancy. Items inquiring about intention to use cannabis if it were to be legalized in Maryland were modeled after the previously reported survey by Fetherston and Lenton (2005).

TABLE 1. Participant Demographics

	Lifetime Cannabis Use				Cannabis Use in Pregnancy		
	Overall (N = 306)	**Ever Used Cannabis (N = 169)**	**Never Used Cannabis (N = 137)**	***P***	**Cannabis Quitters (N = 70)**	**Cannabis Continuers (N = 36)**	***P***
Age (mean, range)	25.9 (14–45)	26.3 (14–45)	25.4 (14–42)	0.592	27.6 (15–41)	25.3 (14–36)	0.042
Trimester				0.235			0.704
1	29 (10)	20 (13)	9 (7)		10 (15)	4 (12)	
2	107 (38)	55 (35)	52 (41)		22 (33)	14 (42)	
3	149 (52)	84 (53)	65 (52)		35 (52)	15 (46)	
Educational level				0.442			0.034
HS graduate	224 (78)	126 (80)	98 (76)		57 (85)	22 (67)	
Not HS graduate	63 (22)	32 (20)	31 (24)		10 (15)	11 (33)	
Hispanic				0.069*			1.000
Yes	5 (2)	5 (3)	0 (0)		3 (5)	1 (3)	
No	267 (98)	147 (97)	120 (100)		61 (35)	32 (97)	
Race				0.235			1.000*
African American	233 (81)	128 (82)	105 (81)		56 (86)	29 (85)	
White	31 (11)	20 (13)	11 (9)		6 (9)	3 (9)	
Other	22 (8)	9 (6)	13 (10)		3 (5)	2 (6)	
Employment				0.958			0.253
Employed	124 (43)	68 (43)	56 (43)		30 (44)	11 (32)	
Unemployed	165 (57)	91 (57)	74 (57)		38 (56)	23 (68)	
Cigarettes—ever							
Yes	119 (42)	93 (59)	26 (20)	<0.001	36 (54)	26 (78)	0.015
No	167 (58)	65 (41)	102 (80)		31 (46)	7 (22)	
Cigarettes—current							
Yes	50 (18)	34 (22)	16 (13)	0.044	9 (14)	18 (53)	<0.001
No	231 (82)	121 (78)	110 (87)		57 (86)	16 (47)	

*Fischer's exact.
HS, high school.

Additional items were added to assess respondents' knowledge of the harms of cannabis use in pregnancy. All survey items were asked in a true/false and yes/no format.

We contrasted responses of the respondents who had ever used cannabis (ever users) and those who had never used. Respondents who reported using cannabis in the 30 days before learning that they were pregnant were considered current users. We also compared responses of the current users who quit using cannabis during pregnancy (quitters) with those respondents who continued use (continuers), via chi-square tests for most items and Fischer's exact test for items with low cell counts. Data were analyzed using STATA versus 14.

RESULTS

Sample Characteristics

A total of 306 surveys were returned. The demographic profile of all respondents is shown in Table 1. Mean age of the sample was 25.9 years, 81% were African American, and 2% reported Hispanic ethnicity. Most respondents were in their third trimester of pregnancy at the time of survey completion (52%).

Cannabis Use

A majority [55% (169)] of the respondents reported lifetime use of cannabis. At the time they found out they were pregnant, 35% (106) of women were current cannabis users. Of respondents who were current users at the time of diagnosis of pregnancy, 66% (70) of them quit using cannabis during pregnancy. Thirty-four percent (36) were continuing to use at the time of the survey.

Lifetime cannabis users were more likely than never users to have ever smoked cigarettes (59% vs 20%, $P < 0.001$) and to be current cigarette smokers (22% vs 13%, $P = 0.044$). Similarly, those who continued cannabis use during pregnancy were more likely than those who quit during pregnancy to have ever used cigarettes (78% vs 54%, $P = 0.0015$) and to be current smokers (53% vs 14%, $P < 0.001$). Those who continued cannabis use during pregnancy were also less likely to have graduated from high school than those who quit (67% vs 85%, $P = 0.034$).

Most respondents who continued to use cannabis during pregnancy reported a decrease in the frequency of use. Among those who reported continued cannabis use, there was a significant decrease in the frequency and amount of reported use compared to pre-pregnancy ($P = 0.008$). Of those who continued to use cannabis during pregnancy, 64% reported at least daily use of cannabis at the time of conception. At the time of the survey, only 25% of continued users reported continuing daily use. Before pregnancy, daily users reported using between 1 and 10 times a day. Every respondent who reported daily use at conception also reported decreasing their frequency of use per day, with reported use of zero to 4 times a day during pregnancy.

Although 94% of women who continued cannabis use during pregnancy reported that they intended to quit at some time during the pregnancy, only 47% of continued users reported intentions to remain cannabis-free after pregnancy. In comparison, 61% of women who successfully quit using by the time of the survey reported that they intended to remain cannabis-free after delivery ($P = 0.19$).

Views About Legalization

Overall, 31% of respondents reported believing that cannabis should be made legal without restrictions, 28% that it should be legal only with a prescription, and 41% that it should not be legalized. Respondents who reported lifetime use of cannabis and those who continued to use cannabis during pregnancy were more likely than those who never used cannabis (45% vs 15%, $P < 0.001$) and those who quit (64% vs 48%, $P = 0.010$), respectively, to believe that cannabis should be legalized (Table 2). Both respondents with lifetime cannabis use and those who continued using during pregnancy were more likely than never users (49% vs 0%, $P = 0.002$) and quitters (91% vs 54%, $P < 0.001$), respectively, to report that they would be more likely to smoke cannabis more outside of pregnancy if it were legal. Overall, 10% of all women and 17% of lifetime users reported that they would smoke cannabis more during pregnancy if it were legal. Sixty-two percent of women who continued use during pregnancy reported that they would increase use during pregnancy if cannabis were legalized.

Knowledge

Seventy percent of respondents reported believing that cannabis could be harmful to a pregnancy. Those who continued to use cannabis during pregnancy were less likely than those who quit to believe that cannabis use could be harmful during pregnancy (26% vs 75%, $P < 0.001$) (Table 3).

TABLE 2. Participant Views Toward Marijuana Legalization

	Overall N (%)	Ever Used Cannabis N (%)	Never Used Cannabis N (%)	*P*	Cannabis Quitters N (%)	Cannabis Continuers N (%)	*P*
Should be legal	85 (31)	67 (45)	18 (15)	<0.001	29 (48)	21 (64)	0.010
Should be legal w/Rx	76 (28)	41 (28)	35 (29)		12 (20)	10 (30)	
Should remain illegal	110 (41)	41 (28)	69 (57)		20 (33)	2 (6)	
Would smoke more if legal and not pregnant				0.002			<0.001
Yes	75 (46)	75 (49)	0 (0)		35 (54)	29 (91)	
No	87 (54)	77 (51)	10 (100)		30 (46)	3 (9)	
Would smoke more if legal and pregnant				<0.001			<0.001
Yes	26 (10)	26 (17)	0 (0)		4 (6)	21 (62)	
No	247 (90)	126 (83)	212 (100)		59 (94)	13 (38)	

TABLE 3. Participants' Perceptions of Harm From Marijuana Use During Pregnancy

	Overall N (%)	Ever Used Cannabis N (%)	Never Used Cannabis N (%)	*P*	Cannabis Quitters N (%)	Cannabis Continuers N (%)	*P*
Do you believe MJ is harmful to a baby during pregnancy?							
Yes	112 (70)	103 (69)	9 (90)	0.284*	47 (75)	8 (26)	<0.001
No	48 (30)	47 (31)	1 (10)		16 (25)	23 (74)	

*Fischer's exact.
MJ, marijuana.

Motivations

The most common reasons cited for quitting or cutting back on cannabis use were to avoid being a bad example (74%), to avoid Child Protective Services (CPS) involvement (66%), to save money (63%), to prove to myself that I can quit (63%), and because it could hurt the pregnancy (62%) (Table 4). The least common reason given for quitting or cutting back was to get people to stop nagging them (19%), or because they were told to do so by a doctor (27%). When comparing the motivations of those who cut back versus those who completely quit, respondents who continued to use cannabis during pregnancy were more likely to be motivated by saving money (86% vs 51%, $P < 0.001$). Women who successfully quit were more likely to report being motivated by the belief that it could hurt their pregnancy (74% vs 39%, $P < 0.001$) or cause long-term harm to their babies (67% vs 31%, $P < 0.001$). Among respondents who quit or cut back, 72% reported that it was specifically due to their pregnancy.

Only one question was asked regarding motivation to continue using. Among all respondents who continued using during pregnancy, 96% reported that they did so to treat nausea. Among those who quit, 31% reported that they had used cannabis early in the pregnancy to treat nausea, but later quit.

DISCUSSION

This study among a largely non-Hispanic African American convenience sample of pregnant women recruited from a single prenatal clinic in Baltimore, Maryland, found that more than half had used cannabis in their lifetime. Although the present study found that 66% of cannabis users quit during their pregnancy, fully one-third reported continuing to use cannabis during pregnancy. In the overall sample, more than 1 in 10 self-reported continued cannabis use during pregnancy, suggesting a relatively common phenomenon. This rate is notably higher than previous reported rates of use (Hedden et al., 2015), which may be related to the population surveyed. Given research findings that indicate such use may not be without risk (Metz and Strickrath, 2015; Leemaqz et al., 2016), these findings underscore the importance of addressing cannabis use in this population.

Although 66% of respondents quit, nearly all of those who continued cannabis use during pregnancy reported an intention to quit. The motivations of those who quit and intended to quit varied from health concerns to legal issues to self-image. Those who quit were significantly more likely to report their motivation to be related to potential harms to their baby, whereas those who continued use were significantly more likely to be motivated to cut back due to monetary concerns. The least common motivation for quitting among all respondents was because a doctor instructed them to do so. It is not clear if this was due to the lack of doctor's knowledge about the patients' cannabis use, the lack of direct instruction if cannabis use were known, or the lack of effectiveness of direct instruction.

Most ever users who quit before or during pregnancy reported the intention to remain cannabis-free after pregnancy. Thus, pregnancy may be an ideal time for women

TABLE 4. Participants' Motivations to Quit Using Cannabis

Motivation	Cannabis Quitters	Cannabis Continuers	*P*
I would like myself better			
Yes	34 (49)	15 (42)	0.500
No	36 (51)	21 (58)	
Using marijuana did not fit who I want to be			
Yes	37 (53)	13 (36)	0.102
No	33 (47)	23 (64)	
To get more things done during the day			
Yes	28 (40)	14 (39)	0.912
No	42 (60)	22 (61)	
To save money			
Yes	36 (51)	31 (86)	<0.001
No	34 (49)	5 (14)	
To not be a bad example			
Yes	48 (69)	30 (83)	0.103
No	22 (31)	6 (17)	
To have more energy			
Yes	29 (41)	19 (53)	0.266
No	41 (59)	17 (47)	
Concern about health problems for me			
Yes	25 (36)	12 (33)	0.808
No	45 (64)	24 (67)	
Because I believe it can hurt my pregnancy			<0.001
Yes	52 (74)	14 (39)	
No	18 (26)	22 (61)	
Because I believe it can cause long term harm for my baby			
Yes	47 (67)	11 (31)	<0.001
No	23 (33)	25 (69)	
To get people to stop nagging me			
Yes	11 (16)	9 (25)	0.247
No	59 (84)	27 (75)	
Because my doctor told me to			
Yes	18 (26)	11 (31)	0.596
No	52 (74)	25 (69)	
To avoid legal problems			
Yes	36 (51)	20 (56)	0.687
No	34 (49)	16 (44)	
To avoid CPS			
Yes	46 (66)	24 (67)	0.922
No	24 (34)	12 (33)	
To prove to myself that I can quit			
Yes	41 (59)	26 (72)	0.168
No	29 (41)	10 (28)	

to make longer-term behavioral changes that could improve their health and the health of their families. In a study performed by Chauchard et al. (2013) using a convenience sample of non-pregnant individuals, an increased chance of continued abstinence was found in those respondents who quit cannabis use due to legal and social concerns. Such concerns are heightened during pregnancy, where a real risk of involvement with CPS exists. In this study, more than half of women cited risks of legal issues as their motivation for quitting in pregnancy. As cannabis use becomes increasingly socially acceptable and the legal environment in the United States changes, overall motivations to quit may shift or decrease altogether, including during pregnancy. It is unclear what effect the changing legal climate will have for women who screen positive for cannabis use at the time of delivery. Few women in our survey reported that they would use more during pregnancy if cannabis were to be legalized. On the other hand, concern about CPS involvement was reported as a prominent motivator to quit.

Concerns have been raised that legalization may affect the perceived safety of cannabis use (Pacula et al., 2015; Moreno et al., 2016). Although in the current study most respondents believed cannabis to be potentially harmful during pregnancy, more than half supported some level of legalization of cannabis. Overall, 46% of women in our study stated that they would use cannabis more often if made legal, but only 10% of women indicated that they would do so during pregnancy. This suggests that women may understand that overall legalization does not necessarily indicate that it is safe to use in pregnancy. It will be important to monitor changes in cannabis use among pregnant women in states with varying laws regarding cannabis possession and use.

Respondents who believed cannabis to be harmful during pregnancies were more likely to quit and more likely to intend to stay quit after pregnancy. Perhaps unsurprisingly, those who did not believe that cannabis use was harmful during pregnancy were more likely to report using it. Whether they had not been exposed to negative information about cannabis use in pregnancy or did not believe it is unclear. Research on the effects of cannabis on the fetus, newborn, and subsequent child development is evolving (Metz and Strickrath, 2015). This highlights the need to further develop understanding of the implications of cannabis use during pregnancy, which would equip providers with more consistent, clear, and up-to-date messaging to convey to patients regarding the harms of cannabis use.

Almost all of the women who continued cannabis use during pregnancy reported doing so to self-medicate for pregnancy-induced nausea. It is unclear if this is related to recall or respondent bias. With the potential negative adverse effects and known risks of some commonly used antiemetics in pregnancy (Danielsson et al., 2014), it is possible that some women are choosing to self-medicate with cannabis rather than taking prescription medications. Further research into this subject area is warranted to investigate this possibility directly.

Cigarette smoking is frequently associated with cannabis use in this population. Women who continued using cannabis in pregnancy were also more likely to use cigarettes. Given the unequivocal evidence that maternal smoking is the largest modifiable risk factor for pregnancy-related morbidity and mortality (Dietz et al., 2010), screening and intervention for cigarette smoking is an important function of prenatal care for this patient population. It is important to note, however, is the more than one-third of women who reported current cannabis use at the time of conception who also reported never having used tobacco. Additionally, the potential effects of cannabis legalization on rates of use of alcohol and other recreational drugs was not evaluated in this study, although future research on these associations would be warranted.

To our knowledge this is the first study evaluating pregnant women's views on the legalization of cannabis. Studies in non-pregnant populations have found favorable attitudes toward legalization (Palamar et al., 2014; Moreno et al., 2016). Intentions to use cannabis if it were legalized were unchanged in some studies (Moreno et al., 2016) and increased in others (Palamar et al., 2014). Evidence on actual changes in use with legalization and decriminalization of cannabis are conflicting. Although many show little to no increase (Choo et al., 2014; Pacula et al., 2015), these studies focus mainly on the changes brought about by legalization of medical cannabis. At least one large international study found an increase in use of cannabis in adolescents in countries with more liberal views and laws on cannabis use (Shi et al., 2015), but others have not shown the same relationship (Harper et al., 2012; Lynne-Landsman et al., 2013; Wall et al., 2011).

This study has several limitations. First, it represents a convenience sample of women at a single prenatal care clinic. As we do not know the response rate or the characteristics of those who declined enrollment, the high rate of cannabis use and differing opinions may represent response bias. However, the reported 35% rate of cannabis use at the initial identification of pregnancy in this cohort is similar to a previous study in the same clinic that showed 29% of patients screened positive for cannabis use at their initial prenatal visit (Mark et al., 2015). The data collected are all self-reported, which is subject to recall bias and underreporting due to fear of loss of confidentiality and social desirability (Garg et al., 2016). However, the anonymous nature of the surveys, and the private space in which they were collected, may have mitigated against these limitations. The survey did not include any questions regarding use of other illicit drugs or alcohol or how use of these substances may affect opinions on the safety and acceptability of cannabis. In addition, the population surveyed was from a single public sector clinical site among English-speaking women with relatively limited racial and socioeconomic diversity. Thus, the findings may not be widely generalizable to other populations or settings.

This study shows that cannabis use is relatively common during pregnancy. A significant minority of women continue to use cannabis during pregnancy, and some even increase use. Motivations to quit use during pregnancy are varied but many are related to legality. In the changing legal climate, there is a need for up-to-date patient information on the effects of cannabis use during pregnancy, as well as research on effective approaches to reduce cannabis use during pregnancy.

CONCLUSIONS

Pregnant women have a wide range of views toward the legalization of cannabis that may impact their use both during

and after pregnancy. Further research on the epidemiology of cannabis use during pregnancy and postpartum relapse is warranted, as is research on the effectiveness of interventions with this population.

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