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ORIGINAL ARTICLE

Cannabis and symptoms of PMS and PMDD

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ABSTRACT

Cannabis has been found to alleviate a wide array of medical symptoms, including those that overlap with physical and emotional symptoms of premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD), including insomnia, irritability, depression, and joint pain. Little work has addressed the use of cannabis as a treatment for PMS or PMDD or the role of women's cannabis treatment expectancies as a predictor of consumption. Women who reported having experienced PMS and PMDD and endorsed lifetime cannabis use ($N = 145$), completed an online survey assessing their frequency of cannabis use, PMS/PMDD symptoms, expectancies of cannabis-induced relief from symptoms, as well as cannabis-related problems. Women were found to hold meaningful expectancies that cannabis would treat all PMS/PMDD symptoms, except for overeating/food cravings. Cannabis treatment expectancies were positively associated with PMS/PMDD symptoms and with monthly cannabis use, and were negatively associated with cannabis-related problems. Research should further examine the relationship of cannabis treatment expectancies with individuals' cannabis use, as findings indicate the potential for these expectancies to serve a punitive or protective role in the development of cannabis-related problems. Increased research on how cannabis might ameliorate symptoms of PMS and PMDD could help establish an alternative treatment plan that offers relief with fewer negative side effects.

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Cannabis; PMS; PMDD; alternative treatment; expectancies

Introduction

Menstruation is a normal and healthy experience among fertile women, but it may lead to debilitating physical discomfort or dysphoria in the weeks preceding each monthly cycle. Approximately 75% of women experience a premenstrual change in emotional or physical symptoms commonly known as premenstrual syndrome (PMS; Wakil et al. 2012). These symptoms, including increased irritability, tension, depressed mood, breast tenderness, and bloating (Wakil et al. 2012) are usually mild, but can be severe enough that they impede daily activities (Yonkers et al. 2008). About 5–8% of women who experience PMS with moderate to severe symptoms associated with significant distress or impairment also meet criteria for a more severe form of PMS, Premenstrual Dysphoric Disorder (PMDD; Yonkers et al. 2008). Both conditions share affective and somatic symptoms, but a PMDD diagnosis requires that symptoms are greater in number and severity than in PMS. Symptoms of PMDD include depressed or labile mood, anxiety, irritability, anger, insomnia, difficulty concentrating, lethargy, marked change in appetite, overeating or specific food cravings, hypersomnia or insomnia, a sense of being overwhelmed or out of control, as well as physical symptoms such as joint or muscle pain, and 'bloating,' or weight gain (American Psychological Association 2013). These symptoms occur exclusively two weeks before menses and cause severe deterioration in daily functioning (Bhatia & Bhatia 2002; Wakil et al. 2012).

Current treatment options for premenstrual symptoms

Treatment options for PMS and PMDD are similar and include hormonal interventions, antidepressants, and lifestyle changes. While some options have shown efficacy, others are still questionable. Further, many of the treatment options available carry adverse effects, making treatment selection a more complicated process. Hormonal interventions for PMS or PMDD include long-acting gonadotropin-releasing hormone (GnRH) agonists, such as leuprolide, and combined oral contraceptives (COCs). Leuprolide results in medical menopause with side effects such as hot flashes, night sweats, and vaginal dryness (Wyatt et al. 2004), and potentially puts women at risk for osteoporosis (Cunningham et al. 2009). COCs have been found to worsen dysphoria (Bhatia & Bhatia 2002) and are associated with a greater likelihood of adverse mood symptoms (Segebladh et al. 2009), as well as increased risk of endometrial cancer, coronary heart disease, breast cancer, stroke and pulmonary embolism (Rossouw et al. 2002). Non-hormonal options, including SSRIs have been found helpful for alleviating symptoms and improving quality of life (Wakil et al. 2012), but a literature review suggests that the percentage of women with PMDD who respond to SSRIs or COCs is lower than the percentage of women who do not respond to the drugs, once the placebo effect is considered (Halbreich 2008). Other less researched treatments include dietary interventions, psychotherapy, vitamins such as vitamin B6, calcium/vitamin D and

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Magnesium (Panay 2011), as well as bright light treatment (Wakil et al. 2012). With current treatment options lacking in efficacy as well as in safety, more research is needed for alternative treatments for management of PMS and PMDD.

PMS/PMDD and cannabis

Cannabis is a proposed non-hormonal alternative treatment for premenstrual symptoms, potentially offering fewer negative side effects to the current available medications. Little formal research has been done to address the use of cannabis for women suffering from PMS/PMDD, but it has been suggested as an efficacious and safe alternative treatment for a wide range of women's conditions including dysmenorrhea (Russo 2002), as well as PMS itself, in doses low enough not to cause cognitive impairment (Grinspoon & Bakalar 1997). Cannabis has a long medicinal history dating back to cultivation in China in 4000 B.C., where Chinese emperor Chen Nung recommended its use for 'female disorders' amongst many other illnesses (Grinspoon & Bakalar 1997). Anecdotally, cannabis was prescribed by Queen Victoria's personal physician, Sir John Russell Reynolds, for her menstrual discomfort throughout her adult life (Russo 2002). After 30 years of experience with cannabis, Reynolds reported that cannabis helped alleviate symptoms associated with menstruation (Reynolds 1890). Current research has found cannabis to ameliorate a variety of symptoms that overlap with those of PMS and PMDD, including sleep problems, irritability, depression, and joint pain (Earleywine 2005; Russo et al. 2007; Russo & Hohmann 2013).

Cannabis treatment expectancies: links to cannabis use and associated problems

As with any substance, individuals have been found to hold expectancies toward cannabis that can influence their experience of cannabis' effects, as well as their use. A study in 1998 found that participants who believed they had consumed a cannabinoid capsule reported enhanced pleasurable effects and increased heart rate following consumption, compared with a control group (Kirk et al. 1998). Another study found that people who expected to smoke hashish in the lab reported feeling 'high', even if hash contained no THC (Camí et al. 1991). Individuals' expectancies, including expectations about generally positive outcomes (such as social and sexual facilitation or relaxation and tension reduction), and those regarding symptom relief, may also influence their frequency or quantity of cannabis use (Schafer & Brown 1991). Individuals who expect that cannabis will create a favorable outcome tend to use more than those who expect otherwise (Vangsness et al. 2001; Skenderian, et al. 2008; Metrik et al. 2009). Early work revealed that these expectancies may mediate established links between disinhibited or impulsive personality traits and cannabis use (Vangsness et al. 2001; Hayaki et al. 2011). Expectancies regarding the alleviation of symptoms support a self-medication hypothesis of cannabis consumption, where those who believe that cannabis will improve their symptoms tend to consume cannabis more often or in greater amounts. This might lead to associations of PMS/PMDD symptoms with cannabis consumption through indirect effects of expectancies. Those with worse symptoms might develop stronger expectancies about cannabis-induced relief through personal experience, modeling, media, or word of mouth. These expectancies would then lead to more consumption of cannabis. A 2014 study on individuals suffering from post-traumatic stress disorder (PTSD) found that individuals' PTSD symptoms correlated with their cannabis use through indirect links related to treatment expectancies (Earleywine & Bolles 2014). Another study examining these variables in a menopausal sample found similar relationships with these variables in regard to menopause symptoms (Slavin et al. 2016). Comparable symptom-specific expectancies may exist for women who use cannabis for PMS/PMDD relief, and these expectancies might mediate the link between symptoms and frequency of use in a similar manner.

Relatedly, research has begun to examine the role that cannabis expectancies play in an individual's development of cannabis use problems, with mixed findings. Although more positive cannabis expectancies can potentially lead to greater use, these positive expectancies do not always correlate to cannabis related problems. In a recent menopausal study, participant's high cannabis treatment expectancies inversely linked to cannabis-related problems (Slavin et al. 2016). Alternatively, global negative expectancies of cannabis in regular and heavy cannabis users have been found to covary with cannabis related problems (Hayaki et al. 2010; Beraha et al. 2013).

Current study

Based on previous findings regarding cannabis's ability to mitigate symptoms, such as sleep problems, irritability, depression and joint pain (Earleywine 2005; Bambico & Gobbi 2008; Ilgen et al. 2013; Haj-Dahmane & Shen 2014), we hypothesized that cannabis would alleviate these overlapping symptoms of PMS/PMDD. As the average age of this current sample (range: 18–65, mean: 35.8, SD: 11.2) was younger than the menopausal sample (range: 30–72, mean: 49.7, SD: 7.5; Slavin et al. 2016), we included age as a variable in all analyzes to account for the possibility of a younger cohort potentially holding more lenient views toward cannabis use that could affect cannabis use and expectancies. Second, we hypothesized that links between symptoms and cannabis use would arise via indirect links through expectancies based on prior work (e.g. Earleywine & Bolles 2014; Slavin et al. 2016). Lastly, we examined the impact of cannabis treatment expectancies, monthly cannabis use, PMS/PMDD symptoms, and age on cannabis-related problems. If cannabis is to be used as an alternative treatment for PMS/PMDD symptoms, it is important that its potential medicinal benefits outweigh any associated increases in problems.

Method

Participant recruitment

Women who reported experiencing PMS or PMDD symptoms and having tried cannabis in their lifetime ($N = 145$)

completed an online survey assessing PMS/PMDD symptoms, expectancies of cannabis-associated relief from PMS/PMDD symptoms, cannabis use, and cannabis related problems. Participants responded to an e-mail request or Facebook advertisement to complete an internet survey on cannabis use and PMS/PMDD. To target potential cannabis users, the initial e-mail was sent to members of a listserv associated with cannabis law reform. The e-mail stated that participants could complete the internet questionnaire and forward it to others (the "snowballing" technique; Callow 1996), for a chance to win a cannabis vaporizer. Participants had the option to send their email address and a secret number to a separate email account if they wanted to be eligible for the prize. The first online page of the study stated that continued participation beyond the first page implied participant consent. All procedures were in accordance with and approved by the local Institutional Review Board.

Measures

Demographics

Participants were queried on age, race, ethnicity, education, and recent cannabis use. See Table 1 for participant demographics.

Table 1. Characteristics of Study Sample.

Characteristic	*n*	%
Age	144	99.3
18–29	44	30.3
30–39	58	40.0
40-49	22	15.2
50-59	17	11.7
60+	3	2.0
Race/Ethnicity	144	99.3
Caucasian	121	83
African American	3	2
Asian	2	1
Hispanic/Latino	3	2
Native American	3	2
Other	12	8
Education	145	100
Some high school	1	<1
Finished high school/GED	20	14
Some college	47	32
Associates degree	20	14
Bachelors degree	31	21
Some graduate training	10	7
Advanced Degree	16	11
Recent Cannabis Use (items not mutually exclusive)	145	100
Past year	145	100
Past month	129	89
Past week	119	82
PMS/PMDD Symptoms (items not mutually exclusive)	145	100
Irritability	140	96.5
Depressive Moods	136	94
Anxiety	126	87
Labile affect	141	97
Decreased interest in daily activities	120	83
Feelings of being out of control	105	73
Lethargy/Fatigue	125	86
Difficulty in concentration	111	77
Sleep problems	118	81
Marked appetite change/overeating/food cravings	122	84
Bloating/weight gain	129	89
Breast tenderness	131	90
Joint and muscular discomfort	111	77

PMS/PMDD symptoms

PMS/PMDD symptoms were assessed by a scale that was created for this study, combining items from the DSM-5 criteria for PMDD (APA 2013) with the most common mood and physical symptoms of PMS (Bloch et al. 1997). The final scale consisted of 13 symptoms: (1) irritability/anger (including interpersonal conflict), (2) depressive mood/sadness (including feeling insecure and low self-esteem), (3) anxiety, (4) labile affect (rapid changes in emotion unrelated to external events or stimuli), (5) decreased interest in usual activities including work/school, social activities, hobbies, (6) a subjective sense of being overwhelmed or out of control, (7) lethargy/fatigue, (8) difficulty in concentration, (9) sleep problems (difficulty in falling asleep, difficulty sleeping through the night, waking up early), (10) marked change in appetite including overeating or food cravings, (11) bloating, (12) breast tenderness, and (13) joint/muscle discomfort. Individuals were queried on their occurrence of each symptom around the week before their period, and asked to rate each symptom on a Likert scale from "none (0)" to "extremely severe (5)". All PMS/PMDD symptoms were endorsed by majority of participants (See Table 1). Cronbach's Alpha for the total symptoms scale was .911.

Expectancies of cannabis-induced changes in PMS/PMDD symptoms

This scale was adapted from the scale used to assess PMS/PMDD symptoms, combining items from the DSM-5 criteria for PMDD (APA 2013) with the most common mood and physical symptoms of PMS (Bloch et al. 1997). It queried participants on their expectancies of how cannabis helps each of these symptoms. Individuals were asked to rate how cannabis makes each of the symptoms feel on a five-point Likert scale ranging from 'extremely worse (−2)' to 'extremely better (2)'. High scores on this scale indicated more positive expectancies toward cannabis treating PMS/PMDD symptoms, while low or negative scores on this scale indicated that participants did not have expectancies of cannabis treating symptoms, or that they expected cannabis to make a symptom worse. Cronbach's Alpha for the total expectancies scale was .859.

Cannabis use

As a measure of frequency of use, we queried participants on how many days a month they used cannabis, ranging from zero to 31 days.

Cannabis-related problems

The Marijuana Problems Scale was used to examine problems associated with cannabis use in the past 90 days (Stephens et al. 2000), consisting of 19 items related to (1) problems with partner, (2) problems in family, (3) neglect of family (4) problems with friends, (5) missing days at work or school, (6) losing a job, (7) lower productivity, (8) medical issues, (9) withdrawal symptoms, (10) blackouts or flashbacks, (11) memory loss, (12) difficulty sleeping, (13) financial difficulties, (14) legal problems, (15) low energy levels, (16) feeling bad about use, (17) lowered self-

Table 2. Differences among Expectancies for PMS/PMDD Symptoms.

PMS/PMDD Symptoms	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12
1. Irritability	1.48 (.63)												
2. Labile affect	1.47 (.61)												
3. Depressive Moods	1.36 (.70)												
4. Anxiety	1.28 (.84)												
5. Sleep Problems	1.26 (.79)												
6. Joint/Muscle Discomfort	1.10 (.88)	*	*	*									
7. Decreased Interest	.97 (.81)	*	*	*	*	*							
8. Feeling out of control	.96 (.86)	*	*	*	*	*							
9. Fatigue	.87 (.81)	*	*	*	*	*							
10. Breast Tenderness	.67 (.73)	*	*	*	*	*	*	*	*				
11. Difficulty Concentrating	.65 (.82)	*	*	*	*	*	*	*	*	*			
12. Bloating	.37 (.68)	*	*	*	*	*	*	*	*	*	*	*	
13. Overeating	.07 (.97)	*	*	*	*	*	*	*	*	*	*	*	*

*$p < .001$. Expectancies are ordered highest (most expected cannabis-induced relief) to lowest.

esteem, (18) procrastination, and (19) lack of self-confidence. Individuals were asked to rate their experience of each of these problems on a Likert scale from 0 (none) to 5 (a serious problem). Cronbach's alpha was .82.

Data analysis

First, we performed a series of one-sample t-tests to determine whether mean expected relief differed from zero for each expectancy. Next, we performed paired t-tests to determine whether women expected greater cannabis-associated relief for some PMS/PMDD symptoms than others. Given the large sample size and number of analyzes, we used a modified Bonferroni approach to balance power and Type I error (Wilcox 2013). The category of analysis received a family-wise error rate of $p < .05$. Thus, the 13 analyzes for differences among average expectancies required p values of $p < .001$ (.05/13) to be considered significant. Third, we examined correlations amongst variables to determine whether mediation analyzes would be appropriate in predicting cannabis use. Lastly, we performed two regression analyzes that included all theoretically-relevant predictors to assess potential suppressor effects and determine whether cannabis expectancies still accounted for a significant amount of unique variance in monthly cannabis use and cannabis-associated problems.

Results

Differences between expectancies

One sample t-tests determined that all expectancies were significantly greater than 0, $p < .001$, (ts(140–144) ranging from 6.43 to 28.86), except for expectancies toward overeating/food cravings, ($t(140) = .870$, $p > .001$). Paired t-tests were performed on all expectancies and revealed differences among several means with expectancies for irritability receiving the highest score (Mean= 1.48, SD= .63), and appetite changes/overeating receiving the lowest (Mean= .07 SD= .97; See Table 2).

Bivariate correlations

Multiple items for PMS/PMDD symptoms, cannabis treatment expectancies, and cannabis-associated problems were collapsed into single variables by calculating total scores among cases. Monthly cannabis use was negatively skewed, so we took the log (base 10) of 1 + the maximum score in the data set (skew= −1.4; transformed skew= .55; Osborne 2013). Cannabis-associated problems were positively skewed, and so a SQRT transformation was used (skew =2.4, transformed skew=.52). These transformed variables were used in all subsequent analyzes. Correlations between all study variables appear in Table 3. Cannabis treatment expectancies were positively associated with PMS/PMDD symptoms and with monthly cannabis use. Cannabis treatment expectancies were negatively associated with cannabis-related problems. Age was positively associated with monthly cannabis use, and negatively associated with symptoms and with cannabis-associated problems. As symptoms did not significantly covary with frequency of use, mediation analyzes were not performed.

Table 3. Table of Correlations.

	Mean (SD)	1	2	3	4
1. Monthly use	23.62 (10.60)				
2. Symptoms	24.91 (10.47)	−.02			
3. Expectancies	12.50 (6.20)	−.23**	.39**		
4. Problems	5.80 (7.11)	.08	.03	−.25**	
5. Age	35.8 (11.2)	−.20*	−.19*	.01	−.25**

*$p < .05$;
*$p < .01$. Monthly use = average number of days of cannabis use per month (correlation signs are switched due to transformation); Symptoms = severity of PMS/PMDD symptoms; Expectancies = expected cannabis-induced relief of PMS/PMDD symptoms; Problems = cannabis-related problems.

Table 4. Predicting Cannabis Monthly Use from Symptoms, Expectancies, and Age.

Variable	*B*	*SEB*	*β*	*t*	*Sig.*
Symptoms	−.01	.09	−.01	−.09	.93
Expectancies	.42	.15	.25	2.75**	<.01
Age	.13	.08	.13	1.61	.11
$F(3,141) = 3.86$, $p < .05$					

*$p < .05$,
**$p < .01$. Monthly Use = average number of days of cannabis use per month; Symptoms = severity of PMS/PMDD symptoms; Expectancies = expected cannabis-induced relief of PMS/PMDD symptoms.

Links to monthly cannabis use

A standard linear regression analysis was performed with monthly cannabis use as the outcome variable, and PMS/PMDD symptoms, expectancies, and age as predictors. The regression analysis was significant, $F(3,141) = 3.86$, $p < .05$. Expectancy was the only variable to have a significant main effect on monthly cannabis use (Beta = .25, $p < .01$). The overall model fit was $R^2 = .08$ (See Table 4).

Links to cannabis-related problems

A standard linear regression analysis was performed with cannabis-associated problems as the outcome variable, and monthly use, symptoms, expectancies, and age as the predictors. The regression analysis was significant, $F(4,141) = 3.16$, $p < .05$. Expectancies was the only variable to have a

Table 5. Predicting Cannabis Problems from Symptoms, Expectancies, Cannabis Frequency and Age.

Variable	*B*	*SEB*	*β*	*t*	*Sig.*
Monthly Use	−.48	1.00	−.04	−.48	.63
Symptoms	.05	.06	.08	.86	.39
Expectancies	−.31	.11	−.27	−2.94**	<.01
Age	−.10	.05	−.15	−1.84	.07
F (4,141) = 3.16, $p < .05$					

**$p < .01$. Monthly Use = average number of days of cannabis use per month; Symptoms = severity of PMS/PMDD symptoms; Expectancies = expected cannabis-induced relief of PMS/PMDD symptoms.

significant main effect on problems (Beta = −.27, $p < .01$). The overall model fit was $R^2 = .08$. (See Table 5).

Discussion

Differences in cannabis treatment expectancies

Given the little research on non-hormonal approaches to the treatment of PMS/PMDD symptoms, we examined self-reported responses to cannabis in a sample of women suffering from PMS and PMDD symptoms. Women reported symptoms and their severities, expectancies of cannabis-induced relief of symptoms, frequency of cannabis consumption, and a measure of cannabis-related problems. Women endorsed significant expectancies that cannabis would ameliorate all symptoms of PMS/PMDD except for overeating/food cravings. Nevertheless, women endorsed significant differences in expectancies indicating that they do not view cannabis as equally effective for all symptoms. Participants reported beliefs that cannabis would help treat irritability, labile affect and depressive moods significantly greater than joint/muscular discomfort, feelings of being out of control, physical and mental exhaustion, breast tenderness, difficulty concentrating, and bloating. In addition, participants also reported beliefs that cannabis would treat anxiety and sleep problems significantly greater than feelings of being out of control, physical and mental exhaustion, breast tenderness, difficulty concentrating, and bloating. A similar study on menopausal women found that participants also expected cannabis to treat symptoms of irritability, depression, anxiety, and sleep problems significantly greater than others, with the addition of joint/muscle discomfort as the highest rated expectancy (Slavin et al. 2016). A potential reason for these slightly discrepant findings may be that joint/muscle discomfort is not as prominent a symptom in PMS/PMDD as it is in menopause, and thus PMS/PMDD sufferers may not have as strong views toward cannabis ameliorating this symptom. If this happened to be the case, it would highlight the role of prior personal experience of cannabis treating a symptom, in creating further positive cannabis treatment expectancies.

Links between expectancies, symptoms, and frequency of cannabis use

Individuals who endorsed high cannabis treatment expectancies were also more likely to endorse higher PMS/PMDD symptoms and higher monthly cannabis use. This set of relationships is consistent with the role of personal experience with cannabis fostering cannabis treatment expectancies. The more frequently individuals consume cannabis, and the more PMS/PMDD symptoms they experience, the more likely they will develop expectancies toward cannabis treating these symptoms; these expectancies may be further reinforced through continued use. Lastly, age was negatively associated with symptoms. This correlation is expected, as women are less likely to experience symptoms of PMS/PMDD as they age and ultimately reach menopause. Interestingly, age was positively correlated with monthly cannabis use, but negatively correlated with cannabis related-problems. The relationships between cannabis use and cannabis-related problems among non-clinical elder populations should be further explored in future research.

Links to monthly cannabis use

Cannabis expectancies positively covaried with monthly cannabis use, but PMS/PMDD symptoms did not. These results differ from findings in a recent menopausal study, in which symptoms correlated with frequency of use indirectly through expectancies (Slavin et al. 2016). A potential reason for the non-significant relationship between symptoms and cannabis use in this study may be due to the high percentage of monthly users among this sample, who likely consume cannabis regardless of symptoms. Participants in this sample reported using cannabis an average of 23.6 days a month, versus 19.6 days a month in the menopausal sample. Further, 82% of users in this study reported past week cannabis use, compared to 70% of users in the menopausal study (Slavin et al. 2016). These relationships indicate that PMS/PMDD symptoms may not be solely driving women in this sample to consume cannabis, but that women have positive expectancies of cannabis treating their symptoms, potentially through experience. Thus, if an individual is using cannabis regularly, and they also experience PMS/PMDD symptoms, their expectancies of cannabis treating these symptoms may be positively reinforced through continued use. Furthermore, another potential reason for the non-significant relationship between PMS/PMDD symptoms and marijuana use is that women may choose to consume cannabis if they feel it will help their symptoms, regardless of the severity of symptoms that they are experiencing.

Links to cannabis related problems

Individuals who believed that cannabis would help their PMS/PMDD symptoms were less likely to experience cannabis-related problems, regardless of their frequency of cannabis use, PMS/PMDD symptoms, or age. Recent, comparable work revealed an inverse association between cannabis-related problems and expectancies for cannabis-induced relief of menopause symptoms (Slavin et al. 2016). Thus, two samples of women have reported expecting cannabis to relieve symptoms in a way that does not appear to increase cannabis-related problems. Nevertheless, these women could have consumed cannabis for other reasons, and these

expectancies for relief of PMS/PMDD symptoms do not necessarily guarantee non-problematic use. These women may likely hold other motives and expectancies regarding cannabis use that could are associated with an increased risk for problems, such as global negative expectancies (e.g. Beraha et al. 2013; Hayaki et al. 2010; Pearson et al. 2017). Future research should examine how symptoms, cannabis use, and treatment expectancies covary with cannabis-related problems among a population of medical users who are primarily consuming cannabis for a specific condition.

Limitations

Several limitations of this study exist, and should be addressed in further research. The first limitation is regarding the generalizability of these findings, as data was collected from individuals subscribing to a cannabis reform listserv. Members of this group may be more likely to underreport problems associated with cannabis use to reduce stereotypes and negative perceptions of cannabis. This tendency may explain the significant positive skew of the untransformed cannabis-related problems variable. Additionally, most participants in this study identified as Caucasian. Assessment of a more diverse population can help researchers gain a greater perspective on the PMS/PMDD experience. A second limitation concerns the method of assessment used, as these findings rely on self-report. Although symptom severity does inherently remain subjective, self-report biases and/or difficulties in recall may lead to inaccurate responses to inquiries regarding frequency of cannabis consumption. We attempted to control for self-report bias by ensuring anonymity of responses. Difficulties in recall could improve with experienced sampling or detailed diary techniques. Lastly, a major limitation of this study is its cross-sectional design. A longitudinal study would be ideal for assessing the impact of cannabis efficacy on relieving PMS/PMDD symptoms as well as the function of expectancies of cannabis use on relieving these symptoms. Further, a clinical trial incorporating a balanced-placebo design (BPD) that independently manipulates delivery of cannabis versus placebo and stimulus expectancy set (instructions plus contextual cues) would be helpful in differentiating the nature of pharmacologic versus expectancy effects of cannabis.

Conclusion

The current data suggest that women expect cannabis to ameliorate symptoms of PMS/PMDD, and these expectancies are negatively associated with cannabis-related problems. Many of the highest endorsed symptoms including irritability, depressive moods, anxiety, and sleep problems have already received empirical support for cannabis's treatment efficacy, and have been previously endorsed in a menopausal study, highlighting cannabis's potential to treat female disorders. However, given the difficulty in surveying cannabis's efficacy in treating symptoms, a randomized clinical trial of medical cannabis for PMS/PMDD would provide more concrete answers to this question.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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