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Research Article

Association between Non-Medical Cannabis Use and Anxiety Disorders in Women

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Abstract

Introduction: Non-medical cannabis use and anxiety disorders are highly prevalent among Canadian women; however, the direction of this assocation remains controversial. The objective of this article is to provide an evidence-based update regarding the effect of non-medical cannabis on anxiety symptoms in women.

Methods: A literature search was conducted using PsychINFO and MEDLINE for articles related to cannabis and marijuana use among women with anxiety or anxiety disorders. Only English language literature from 2010 to 2020 was reviewed. Studies including patients under the age of 18 and studies addressing medical cannabis were excluded. Four studies met our inclusion criteria for this review.

Results: Cannabis use and anxiety disorders are both highly prevalent among young women. Other substance use in addition to cannabis is frequently reported by women. Reasons for cannabis use by women with anxiety differed from those of men. Findings did not show a direct association between cannabis use and anxiety symptoms. Women who used cannabis did not report higher rates of anxiety nor did anxiety predict the onset of cannabis use.

Conclusion: There is no evidence to indicate that non-medical cannabis use worsens anxiety symptoms among women. Further studies should focus on reducing potential confounding factors and developing a reliable method of quantifying cannabis use in order to determine the direction of the interaction between cannabis and anxiety disorders among women.

Keywords: Cannabis; Anxiety; Women's health

Abbreviations

NSDUH: National Survey on Drug Use and Health; THC: Delta-9-Tetrahydrocannabinol

Introduction

Cannabis is the most commonly used psychoactive substance in North America. Key findings from the 2019 NSDUH show that past month cannabis use significantly increased to 7.6% from 5.1% in 2016 among adult women aged 26 and older [1]. However, cannabis use disorder increased to 2.8% among women aged 12 to 17 years and 4.8% of those aged 18 to 25 years. In Canada, approximately 11% of women reported past year cannabis use in 2017 with highest rates among those aged 18 to 24 years [2]. While motives to use cannabis differ, reducing anxiety is a common reason especially among female cannabis users [3,4]. THC, is the main psychoactive ingredient in cannabis and has been associated with the acute effects of cannabis specifically anxiety secondary to its effect on serotonin and noradrenaline [5]. The average concentration of THC in cannabis has increased significantly since 2010 and therefore, more pronounced acute and chronic effects may be seen among current users [6]. Data addressing the sex differences in cannabis use found that more women reported increased anxiety as an acute effect of cannabis use and more women experienced anxiety during withdrawal [7,8]. Although cannabis use is more prevalent among women with anxiety disorders, the evidence about its association with anxiety is not as robust. The debate continues whether cannabis use is associated with the development of anxiety disorders and whether cannabis has an anxiogenic response in patients with anxiety disorders [9]. Recent meta-analyses have found mixed results regarding the directionality of the association of cannabis use with anxiety symptoms in the general population which makes it difficult to decide whether anxiety is a precursor to cannabis use or whether cannabis is used for its stress-relieving properties [10,11]. Furthermore, meta-analyses have not addressed sex-specific differences in the association between nonmedical cannabis use and anxiety. The objective of this review article is to determine if there is an association between non-medical cannabis use and anxiety symptoms among women.

Methods

We conducted a literature search in PsychINFO and MEDLINE using the following MESH headings and key words: cannabis or marijuana AND anxiety or anxiety disorders or mental health AND female. For the purpose of this review, anxiety was used as an umbrella term to include any type of anxiety disorder. References of articles were also reviewed for additional studies. Only English language literature from 2010 to 2020 was reviewed. Studies were included if they provided results for women specifically. We decided to exclude studies prior to 2010 due to evidence showing that the potency of

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Table 1: Summary of included studies.

Author	Year	Recruitment sites	Sample Size (number of women)	Population characteristics
de Dios et al.	2010	Community sample, Rhode Island, USA	332-only women	Mean age 20.5 years 68% caucasian 70% some college education 96% never married
Buckner et al.	2012	University students, Multiple sites, USA	74 women out of 174 participants 42.5% female	Mean age 29.4 years 84% caucasian
Grunberg et al.	2015	University students Colorado, USA	176 women out of 375 participants 51.9% female Women and men were equally represented in each cannabis use group	Mean age 18 years 70-80% caucasian Age, gender and ethnicity did not differ among cannabis groups
Danielsson et al.	2016	Community sample Stockholm, Sweden	4982 women out of 8598 participants 40% female among cannabis users	Cannabis users were younger (mean age 34.4 years), had more serious family tension (40%) and had more alcohol-related problems and illicit drug use

THC has increased significantly from 2010 onwards. Studies that enrolled persons under the age 18 and studies focused on medical cannabis were excluded.

Results

Only four articles met our inclusion criteria [12-15]. All four studies attempted to control for the presence of confounding factors such as other drug use, and psychiatric co-morbidities by excluding participants with psychosis, high risk suicidal behaviors and severe psychopathology. Summary demographics for each study is presented in Table 1. One study recruited only women participants while in the other three studies, women represented at least 40% of the study population. The mean age of participants ranged from 18 to 34 years.

Lack of standardized assessment of cannabis use and anxiety disorders

All four studies had difficulty quantifying cannabis use due to the fact that, unlike other substances that are consumed in discrete units, there is no standard method for quantifying cannabis use. An added barrier is the inability to control for THC concentration and potency making comparison of cannabis use challenging between studies. Cannabis use was based on self-report in all studies with no objective validation of extent of cannabis exposure. De Dios et al. used a Timeline Follow Back (TLFB) for self-report of past 90 days cannabis use [12]. Buckner et al. asked participants to quantify their use on an 8 point Likert scale (0 = none at all, to 8 = more than several times a day) using the Marijuana Smoking History Questionnaire and quantity was assessed using a visual presentation of joint sizes [13]. Grundberg et al. also used TLFB self-report past month cannabis use to classify participants into three groups: never used, relatively infrequent users (used 4 times or less per month for less than 3 years), and regular frequent marijuana users (used 5 days or more per week for at least the past year) [14]. Lastly, Danielsson et al. used a postal self-report questionnaire about past year cannabis use to dichotomize cannabis use into non-users and cannabis users [15]. The variability in assessing the extent of cannabis use provided different categories of cannabis use in each study (Table 2).

Studies also used different tools and scales to assess anxiety and severity of symptoms. These included the Psychiatric Diagnostic Screening Questionnaire, Social Interaction Anxiety Scale, Achenbach System of Empirically Based Assessment Adult Self-Report, as well as, the Sheehan Patient-Related Anxiety Scale and Symptom Checklist [12-15]. None of these studies used a psychiatric interview to diagnose anxiety, but instead used these scales for self-report of anxiety symptoms. This made it difficult to compare anxiety outcomes across studies since the diagnosis of anxiety in these populations included a variety of anxiety conditions such as General Anxiety Disorder (GAD), Social Anxiety Disorder (SAD) and panic attacks.

Polysubstance use is common among women with cannabis use

Cannabis use did not occur in isolation and all studies screened for concomitant alcohol, tobacco or other illicit drug use in order to eliminate confounding effects. De Dios et al. used the TLFB to assess past 90 day alcohol and other substance use [12]. Buckner et al. recruited participants from a larger study which was focused on tobacco smokers for a cessation program [13]. Extent of cigarette smoking was not disclosed in this publication; however, authors mentioned that tobacco smokers had higher rates of cannabis use and related problems. Grundberg et al. asked study participants to abstain from alcohol for 24 hours, cannabis for 6 hours and cigarettes for 1 hour prior to each assessment to ensure no impairment at time of questionnaire completion, but did not assess for extent of substance use between assessment periods [14]. Danielsson used the postal questionnaire to screen for other illicit drug use and the AUDIT score for alcohol related problems [15]. None of the studies provided prevalence data in terms of the extent of concomitant substance use and other substance use was not an exclusion criteria for participating in these studies. However, some researchers attempted to control for co-exposures in their analyses or discussions.

Direction of association between non-medical cannabis use and anxiety among women

The four studies did not show any direct association between non-medical cannabis and anxiety among women (Table 2). Reasons for cannabis use were related to the anxiety disorder. De Dios et al. found that its sample of young adult females had a high prevalence of anxiety with 24% exceeding diagnostic GAD cutoff [12]. In this study, researchers indicated that cannabis use followed the presence of GAD symptoms and was not a result of cannabis use. Women also reported that cannabis use served to relieve tension and provide relaxation. Buckner et al. found no significant correlation between frequency of cannabis use and symptoms of social anxiety [13]. Findings indicated that women with SAD used cannabis for different reasons than men. Women were found to use cannabis for social motives and not for coping or conformity motives. Furthermore, SAD among women

Table 2: Cannabis use, anxiety symptoms and associated outcomes.

Author	Cannabis use	Anxiety symptoms	Association between cannabis and anxiety
de Dios et al.	Cannabis use on mean 52 out of past 90 days 53% met criteria for cannabis abuse 40% met criteria for cannabis dependence	24% exceeded threshold for GAD 3.87 mean number of anxiety problems	Anxiety symptoms and cannabis use was mediated by expectancy that cannabis will relieve tension and help women relax
Buckner et al.	Women reported mean cannabis use of 5.14 out of 8 Mean cannabis quantity of 3.53 Mean number of cannabis problems at 3.00 out of 19	Women reported mean social anxiety score of 16.96 (score below social phobia)	Women did not demonstrate any correlation between cannabis use and social anxiety symptoms Women with social anxiety correlated significantly with social motives for cannabis use
Grunberg et al.	Infrequent users: used 0.87 grams on 1.65 out of 30 past days for average 0.32 grams per use day Frequent users: Used 24.45 grams on 26.07 days out of 30 past days for average 0.92 grams per use day	4.39% of never users reported at risk anxiety 15.04% of infrequent users reported at risk anxiety 13.19% of infrequent users reported at risk anxiety	No effect of cannabis use on anxiety symptoms independent of gender Harm avoidance temperament may interact with cannabis use to predict risk for anxiety independent of gender
Danielsson et al.	No data provided on amount of cannabis use 1275 out of 8598 reported lifetime cannabis use – 40% were female	Severity of anxiety scores not provided RR=1.08 for women, adjusted for confounders	No association between cannabis use and anxiety symptoms among women when adjusted for confounders History of anxiety at baseline did not increase risk of cannabis use at 3 year follow-up

was not related to cannabis-related problems, but instead to alcohol-related problems. Grunberg et al. also documented no relationship between cannabis use and anxiety symptoms regardless of gender [14]. However, participants who used cannabis were more likely to meet or exceed threshold for clinical levels of anxiety. Researchers hypothesized that women with certain temperament characteristics such as harm avoidance were more likely to be susceptible to the effects of cannabis. Finally, Danielsson et al. did not find any association between cannabis use and self-reported anxiety among women with cannabis effects mediated by childhood adverse circumstances such as family tension [15].

Conclusion

This review to determine whether recreational cannabis use exacerbates anxiety symptoms in adult women failed to confirm the directionality of this relationship. Given the high prevalence of cannabis use and the spectrum of anxiety disorders among young women, recent studies did not show that cannabis use increased anxiety symptoms. However, there was a trend towards cannabis use being reported more frequently by women with anxiety disorders to reduce tension and enhance relaxation. Based on these findings, family physicians should assess and manage underlying mental health disorders that occur concomitantly with cannabis use. Other substance use such as alcohol and cigarette smoking should also be discussed when advising women about cannabis use. Women should also be counselled about the long-term risks of regular cannabis use including the development of cannabis use disorder and cannabis-related problems. The association between cannabis and anxiety disorders remains an area of ongoing debate and longer-term follow-up studies are required to confirm the directionality in the relationship between anxiety and cannabis use among women.

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