JOURNAL OF PALLIATIVE MEDICINE
Volume 22, Number 10, 2019

DOI: 10.1089/jpm.2018.0529

Patterns of Medical Cannabis Use among Cancer Patients from a Medical Cannabis Dispensary in New York State

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Abstract

Background: Research on the patterns of use of medical cannabis among cancer patients is lacking.
Objective: To describe patterns of medical cannabis use by patients with cancer, and how patterns differ from patients without cancer.
Design/Measurements: We performed secondary data analysis using data from a medical cannabis licensee in New York State, analyzing demographic information, qualifying conditions, and symptoms, and the medical cannabis product used, including tetrahydrocannabinol (THC) to cannabidiol (CBD) ratios.
Setting/Subjects: Adults age ≥18 who used New York State medical cannabis licensee products between January 2016 and December 2017.
Results: There were a total of 11,590 individuals with 1990 (17.2%) having cancer who used at least one cannabis product. Patients with cancer using cannabis were older and more likely to be female. The most common qualifying symptom for both cancer and noncancer patients was severe or chronic pain. Cancer patients were more likely to use the sublingual tincture form of cannabis ($n = 1098$, 55.2%), while noncancer patients were more likely to use the vaporization form ($n = 4222$, 44.0%). Over time, across all patients, there was an increase in the THC daily dose by a factor of 0.20 mg/week, yielding a corresponding increase in the THC:CBD daily ratio. Compared with noncancer patients, these trends were not different in the cancer group for THC daily dose, but there were less pronounced increases in the THC:CBD daily ratio over time among cancer patients.
Conclusions: Our study found some key differences in demographics and medical cannabis product use between patients with cancer and without cancer.

Keywords: cancer; cannabis; CBD; medical marijuana; THC

Introduction

As of 2018, a total of 31 states in the United States have passed laws to allow access for medical cannabis.[1] Cancer is a qualifying condition for nearly all the states' medical cannabis programs. There is some evidence that cannabinoids in cannabis may be effective in the management of several associated symptoms of cancer, including cancer-related pain,[2] neuropathic pain,[3] cachexia,[4] and nausea and vomiting.[4] In addition, there is great interest in cannabis for the treatment of anorexia, sleep, anxiety, and even antineoplastic effects.[5]

However, despite the increasing access for cancer patients, there remain limited data on the benefits and risks of cannabis for cancer-related symptom management, largely due to federal regulations. Furthermore, medical cannabis comes in different forms of delivery with varying levels of the main therapeutic cannabinoids of cannabis: tetrahydrocannabinol (THC) and cannabidiol (CBD), and little is understood regarding the efficacy of different products and doses.

Most studies on patterns of cannabis use among patients with cancer are limited to a single site. One study from an Israeli hospital found that among 279 patients with cancer who were given cannabis, the most common indication was

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Accepted January 15, 2019.

pain (75.6%) with smoking being the most common method of administration, and of the 151 patients alive at six months, 46% had renewed their prescription.[6] Another study of 926 patients with cancer who completed an anonymous survey at a cancer center in Washington State found that among active users of cannabis ($n = 220$), most inhaled or consumed edibles and used it primarily for physical (pain, nausea, and appetite) and neuropsychiatric symptoms (stress, coping with illness, depression, and sleep).[7]

However, larger scaled studies of the patterns of medical cannabis use by patients with cancer are lacking, especially in regard to dosing of THC and CBD. The aim of this study was to use data from a large medical cannabis dispensary in New York State to better understand the demographic characteristics, condition and symptom indications, method of cannabis delivery, formulation, and dosing for patients with cancer using medical cannabis, and how these patterns differ from patients using medical cannabis without cancer.

Materials and Methods

Setting

In July 2014, New York State enacted the Compassionate Care Act, to allow patients to access medical cannabis. The law makes patients eligible to use medical cannabis if they have been diagnosed with a specific severe, debilitating, or life-threatening condition accompanied by an associated symptom. The qualifying conditions included during this study period were as follows: cancer, HIV/AIDS, amyotrophic lateral sclerosis, Parkinson's disease, multiple sclerosis, spinal cord nerve injury with intractable spasticity, epilepsy, inflammatory bowel disease, chronic pain, neuropathy, Huntington's disease, and post-traumatic stress disorder. The associated qualifying symptoms included the following: cachexia or wasting syndrome, severe or chronic pain, severe nausea, seizures, or severe or persistent muscle spasms. Details of the Compassionate Care Act can be found elsewhere.[8]

We analyzed deidentified data from all individuals, ages 18 and older, using medical cannabis products from the largest New York Registered Organization licensed to cultivate, manufacture, and dispense medical cannabis, Columbia Care LLC, between the dates of January 1, 2016, and December 31, 2017. Columbia Care LLC is the largest manufacturer and distributor of precisely formulated cannabinoid-derived medicines in the United States. During the study period, Columbia Care LLC had four locations in New York State: New York City, Long Island, Rochester, and Plattsburgh serving New York State residents of 50 counties. All patients pay out of pocket for medical cannabis products permitted for sale by the program. Details of the Columbia Care LLC operations can also be found on its website.[9]

The variables analyzed in this study were based on all purchases from patients, whose first invoices for dispensed medical cannabis products from Columbia Care LLC occurred during the study period. Patient-related variables included age at patient's first invoice during the study period, gender, patient residence (divided into New York City counties, Long Island counties, and all other counties), qualifying condition, and qualifying symptoms. Medical cannabis-related variables included day supply, method of cannabis delivery (options available according to New York State regulations include sublingual tincture, vaporization cartridge, tablet or capsule), and dose level of THC and CBD (in milligrams). Products are classified by their ratio of THC:CBD content as high THC:low CBD ratio (20:1), equal THC:CBD ratio (1:1), and low THC:high CBD ratios (1:20 and 1:2).

Statistical analyses

We compared data for those with and without cancer, and conducted analyses in three stages. First, we compared demographic and qualifying conditions and symptoms between the two groups by using logistic regression models with study group (i.e., cancer patients vs. noncancer patients) as the outcome and each characteristic as the predictor. We conducted bivariate analyses and multivariate analyses controlling for all variables in this analysis stage.

Second, we compared cancer and noncancer patients based on medical cannabis product use. To account for when patients had multiple invoices over the two-year period, we computed within-person averages and then made comparisons based on these person-level averages. Specifically, across all invoices for an individual, we computed the person-averaged day supply, total number of invoices, the most common method of cannabis delivery, and THC to CBD ratio (i.e., high THC:low CBD, equal THC:CBD, and low THC:high CBD). For these latter two variables, we categorized an individual as being most common in a group if the method or dose ratio was most common across all the invoices. If there was a ''tie'' (e.g., three invoices for vaporization cartridge and three for capsules), we selected the category with the highest ''value'' (which would be capsules because capsule was coded as 3 and vaporization cartridge was coded as 2). Similar to stage 1, we computed bivariate and multivariate analyses controlling for all variables in the table.

In the third stage, we sought to characterize longitudinal changes in THC and CBD dosing, and THC:CBD ratios over time. To conduct these analyses, we estimated multilevel models to examine change over time. We computed averages in these variables for each day to account for multiple invoices in a day and computed a variable for the number of days from the first invoice in our dataset for each subsequent day. To make the beta coefficient for time more interpretable, we transformed it by dividing by seven, resulting in a variable that would correspond to average change in dose/ratio across a one-week period.

We accounted for clustering of observations within patients and allowed for slopes to differ with time across patients. Models consisted of the daily dose (total dose of product given at a specific day) of THC and CBD and THC:CBD daily ratio (using continuous THC and CBD values, not specific product ratios) as the outcomes (each in separate models), with predictors being cancer group, time (in weeks), and an interaction between cancer status and time. Data were analyzed using Stata SE version 13 (2009; StataCorp, College Station, TX). This secondary data analysis of deidentified data was exempt for review by our institutional review board.

Results

During the study period, there were a total of 11,590 individual patients who used at least 1 medical cannabis product from Columbia Care LLC in New York State. Among patients, 17.2% ($n = 1990$) had the qualifying condition of

cancer. Differences between cancer and noncancer patients in terms of demographics, qualifying conditions, and associated symptoms are presented in Table 1.

Compared with noncancer patients, cancer patients were older (odds ratio [OR] = 1.03, 95% confidence interval [CI] = 1.03–1.04), less likely to be male versus female (OR = 0.79, 95% CI = 0.72–0.87), and to live in all other counties versus New York City counties (OR = 0.84, 95% CI = 0.74–0.97). Among cancer patients, the most common comorbid qualifying condition was neuropathy ($n = 145$, 7.3%), followed by chronic pain ($n = 95$, 4.8%). The most common qualifying symptom for cancer patients was severe or chronic pain ($n = 1393$, 70.0%), followed by severe nausea ($n = 722$, 36.3%) and cachexia or wasting syndrome ($n = 624$, 31.4%). Among noncancer patients, chronic pain was the most common qualifying condition ($n = 4140$, 43.1%) followed by neuropathy ($n = 3484$, 36.3%).

The overwhelmingly most common symptom in the noncancer population was severe or chronic pain ($n = 8267$, 86.1%), followed by severe or persistent muscle spasms ($n = 2635$, 27.5%), and severe nausea ($n = 514$, 5.4%). Cancer patients were significantly less likely to have all qualifying conditions and symptoms compared with noncancer patients except for cachexia or wasting syndrome (OR = 15.61, 95% CI = 13.39–18.19) and severe nausea (OR = 10.07, 95% CI = 8.86–11.43), where they were more likely to have these qualifying symptoms. In multivariate analyses controlling for all variables, as given in the table, results remained largely the same except that cancer patients were less likely to live in Nassau/Suffolk Counties versus New York City Counties

Table 1. Demographic Characteristics and Qualifying Conditions/Symptoms for Individuals Who Used Medical Cannabis Products during Study Period

Characteristic	*All patients* (n = *11,590*), N *(%)*	*Noncancer patients* (n = *9600*), N *(%)*	*Cancer patients* (n = *1990*), N *(%)*	*Comparison*[a]	
				Bivariate, OR (95% CI)	*Multivariate, AOR (95% CI)*
Age, years					
Mean (SD)	53.5 (16.2)	52.1 (16.3)	60.2 (13.9)	**1.03 (1.03, 1.04)**	**1.03 (1.02, 1.04)**
Median	54	53	61		
Age range (age at date of first invoice)	18–100	18–100	19–95		
Sex					
Female	5850 (50.5)	4748 (49.5)	1102 (55.4)	Ref.	Ref.
Male	5734 (49.5)	4846 (50.5)	888 (44.6)	**0.79 (0.72, 0.87)**	**0.78 (0.64, 0.95)**
Other	6 (0.1)	6 (0.1)	0	—	—
Patient's residence					
New York City Counties	2196 (19.0)	1799 (18.7)	397 (20.0)	Ref.	Ref.
Nassau/Suffolk Counties (Long Island)	4671 (40.3)	3820 (39.8)	851 (42.8)	1.01 (0.88, 1.15)	**0.62 (0.47, 0.82)**
All others	4723 (40.8)	3981 (41.5)	742 (37.3)	**0.84 (0.74, 0.97)**	1.05 (0.80, 1.38)
Qualifying condition					
Cancer	1990 (17.2)	0	1990 (100)	—	—
HIV/AIDS	194 (1.7)	188 (2.0)	6 (0.3)	**0.15 (0.07, 0.34)**	**0.00 (0.00, 0.00)**
ALS	37 (0.3)	37 (0.4)	0	—	—
Parkinson's disease	291 (2.5)	285 (3.0)	6 (0.3)	**0.10 (0.04, 0.22)**	**0.00 (0.00, 0.00)**
Multiple sclerosis	605 (5.2)	599 (6.2)	6 (0.3)	**0.05 (0.02, 0.10)**	**0.00 (0.00, 0.00)**
Spinal cord injury with spasticity	784 (6.8)	764 (8.0)	20 (1.0)	**0.12 (0.08, 0.18)**	**0.00 (0.00, 0.01)**
Epilepsy	286 (2.5)	277 (2.9)	9 (0.5)	**0.15 (0.08, 0.30)**	**0.00 (0.00, 0.01)**
Inflammatory bowel disease	732 (6.3)	721 (7.5)	11 (0.6)	**0.07 (0.04, 0.12)**	**0.00 (0.00, 0.00)**
Neuropathy	3629 (31.3)	3484 (36.3)	145 (7.3)	**0.14 (0.12, 0.16)**	**0.00 (0.00, 0.01)**
Huntington's disease	5 (0.04)	5 (0.1)	0	—	—
PTSD	52 (0.5)	52 (0.5)	0	—	—
Chronic pain	4235 (36.5)	4140 (43.1)	95 (4.8)	**0.07 (0.05, 0.08)**	**0.00 (0.00, 0.00)**
Qualifying symptom					
Cachexia or wasting syndrome	897 (7.7)	273 (2.8)	624 (31.4)	**15.61 (13.39, 18.19)**	**13.95 (10.00, 19.46)**
Severe or chronic pain	9660 (83.4)	8267 (86.1)	1393 (70.0)	**0.38 (0.34, 0.42)**	**9.99 (7.40, 13.49)**
Severe nausea	1236 (10.7)	514 (5.4)	722 (36.3)	**10.07 (8.86, 11.43)**	**14.07 (10.54, 18.78)**
Seizures	344 (3.0)	309 (3.2)	35 (1.8)	**0.54 (0.38, 0.77)**	**11.03 (4.74, 25.66)**
Severe or persistent muscle spasms	2856 (24.6)	2635 (27.5)	221 (11.1)	**0.33 (0.29, 0.38)**	**1.39 (1.08, 1.80)**

References for ORs for qualifying conditions and symptoms are all other patients without respective conditions/symptoms. Multivariate analysis controls for age, sex, patient residence, and all qualifying conditions and symptoms except for cancer, ALS, Huntington's disease, and PTSD.

[a]Noncancer patients as reference.

ALS, amyotrophic lateral sclerosis; AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio; PTSD, post-traumatic stress disorder; SD, standard deviation.

Bolded odds ratios are statistically significant at $p < 0.05$ level.

Table 2. Medical Cannabis Product Characteristics for Individuals Who Used Medical Cannabis Products during Study Period

Characteristic	*All patients (n = 11,590), N (%)*	*Noncancer patients (n = 9600), N (%)*	*Cancer patients (n = 1990), N (%)*	*Comparison*[a]	
				Bivariate, OR (95% CI)	*Multivariate, AOR (95% CI)*
Patients with only one invoice	4083 (35.2)	3328 (34.7)	755 (37.9)	**1.15 (1.04, 1.27)**	**1.13 (1.01, 1.26)**
Mean day supply (SD)	16.1 (7.6)	16.0 (7.6)	16.3 (7.6)	1.00 (1.00, 1.01)	**1.01 (1.01, 1.02)**
Mean number of invoices (SD)	5.4 (6.9)	5.5 (7.0)	5.0 (6.4)	**0.99 (0.98, 0.99)**	**0.99 (0.98, 1.00)**
Method of cannabis delivery most common					
Sublingual tincture	4227 (36.5)	3129 (32.6)	1098 (55.2)	Ref.	Ref.
Vaporization cartridge	4770 (41.2)	4222 (44.0)	548 (27.5)	**0.37 (0.33, 0.41)**	**0.32 (0.29, 0.36)**
Capsules	2593 (22.4)	2249 (23.4)	344 (17.3)	**0.44 (0.38, 0.50)**	**0.42 (0.37, 0.48)**
Cannabis formulation product by ratio of THC to CBD[b]					
High THC:low CBD	4643 (40.1)	3845 (40.1)	798 (40.1)	Ref.	Ref.
Equal	3549 (30.6)	2857 (29.8)	692 (34.8)	**1.17 (1.04, 1.31)**	0.94 (0.83, 1.06)
Low THC:high CBD	3398 (29.3)	2898 (30.2)	500 (25.1)	**0.83 (0.74, 0.94)**	**0.61 (0.54, 0.70)**

Multivariate analysis controls for all variables in table.

[a]Noncancer patients as reference.

[b]Products classified as high THC:low CBD ratio (20:1), equal THC:CBD ratio (1:1), and low THC:high CBD ratios (1:20 and 1:2).

AOR, adjusted odds ratio; CBD, cannabidiol; CI, confidence interval; OR, odds ratio; SD, standard deviation; THC, tetrahydrocannabinol.

Bolded odds ratios are statistically significant at $p < 0.05$ level.

(adjusted odds ratio [AOR] = 0.62, 95% CI = 0.47–0.82), and were more likely to have severe chronic pain (AOR = 9.99, 95% CI = 7.40–13.49), to have seizures (AOR = 11.03, 95% CI = 4.74–25.66), and to have severe or persistent muscle spasms (AOR = 1.39, 95% CI = 1.08–1.80).

Table 2 presents medical cannabis product characteristics between cancer and noncancer patients. Cancer patients used nearly the same mean day supply of products compared with noncancer patients, but differed in other characteristics. Compared with noncancer patients, cancer patients had a lower mean number of invoices (OR = 0.99, 95% CI = 0.98–0.99), were substantially less likely to have the most common delivery methods being vaporization cartridge (OR = 0.37, 95% CI = 0.33–0.41) and capsules (OR = 0.44, 95% CI = 0.38–0.50) versus sublingual tincture, and more likely to having the most common ratio of THC to CBD to be equal (OR = 1.17, 95% CI = 1.04–1.31). They were less likely to use low THC:high CBD formulations (OR = 0.83, 95% CI = 0.74–0.94) versus high THC:low CBD formulations. Results remained largely the same in multivariate analyses.

Table 3 shows results from the fixed effects from multilevel models assessing longitudinal change in THC and CBD daily dose and THC:CBD daily ratio. For THC daily dose, the total sample mean dose at intercept was 13.28 mg (95% CI = 12.84–13.72) and cancer patients had a lower daily dose (beta coefficient = −1.14, 95% CI = −2.20 to −0.08). There was a statistically significant increase in THC dose per week (beta coefficient = 0.20, 95% CI = 0.18–0.23), but no differences were seen in this trend for cancer and noncancer patients. For CBD daily dose, the total sample mean dose at intercept was 8.08 mg (95% CI = 7.84–8.32), with no differences between cancer versus noncancer patients.

While we observed no change in CBD daily dose over time, there was a statistically significant interaction for time by cancer group (beta coefficient = 0.04, 95% CI = 0.00–0.08). For THC:CBD daily ratio, the mean ratio at intercept was 6.82 (95% CI = 6.66–6.98), and cancer patients had a higher ratio than noncancer patients (beta coefficient = 0.76, 95% CI = 0.37–1.15). The daily ratio increased per week (beta coefficient = 0.13, 95% CI = 0.12–0.14), and there was a statistically significant

Table 3. Fixed Effects for Multilevel Models of Time Trends for Tetrahydrocannabinol and Cannabidiol Daily Dose and Tetrahydrocannabinol:Cannabidiol Daily Ratio

Characteristic	*THC daily dose beta coefficient (95% CI)*	*CBD daily dose beta coefficient (95% CI)*	*THC:CBD daily ratio beta coefficient (95% CI)*
Intercept	**13.28 (12.84, 13.72)**	**8.08 (7.84, 8.32)**	**6.82 (6.66, 6.98)**
Cancer (vs. no cancer)			
No	Ref.	Ref.	Ref.
Yes	**−1.14 (−2.20, −0.08)**	−0.23 (−0.81, 0.35)	**0.76 (0.37, 1.15)**
Time (per week)	**0.20 (0.18, 0.23)**	−0.02 (−0.03, 0.00)	**0.13 (0.12, 0.14)**
Cancer × Time interaction	−0.05 (−0.11, 0.01)	**0.04 (0.00, 0.08)**	**−0.05 (−0.07, −0.03)**

Multilevel models account for clustering of observations within subjects and random effects for slopes of time. Time corresponds to a change in dose/ratio across an average one week from date of first invoice. Interaction corresponds to difference in dose/ratio change across time comparing cancer to noncancer patients. THC:CBD daily ratio is based on continuous values, not by product label.

CBD, cannabidiol; CI, confidence interval; SD, standard deviation; THC, tetrahydrocannabinol.

Bolded beta coefficients are statistically significant at $p < 0.05$ level.

interaction for time by cancer group such that the increase in THC:CBD ratio was less pronounced in the cancer group (beta coefficient = −0.05, 95% CI = −0.07 to −0.03).

Discussion

This analysis of data from a large medical cannabis dispensary in New York State found several key differences between patients with cancer and without cancer who use medical cannabis. As expected, cancer patients' main qualifying associated symptom for medical cannabis use focused on pain, severe nausea, and cachexia, similar to findings among cancer patients in other places.[6,7] Although high-quality evidence is limited, studies have supported the use of cannabinoids for some of these symptoms in patients with cancer.[10,11] For noncancer patients, chronic pain or neuropathy was the most common qualifying condition, with severe or chronic pain and muscle spasms being the most common associated or complicating symptoms.

The high use of medical cannabis among noncancer patients for neuropathy or chronic pain may explain some of the differences noticed in cannabis formulation ratios of THC and CBD in this study. THC is the psychoactive cannabinoid that produces the euphoric effects of cannabis and may have a role in the analgesic, antispasmodic, and antiemetic properties of the drug. Meanwhile, CBD is a nonpsychoactive cannabinoid that may reduce the psychoactive effects of THC[12] and may also have therapeutic implications as an anti-inflammatory, antispasmodic, antiepileptic, anxiolytic, and neuroprotective agent.[13–15] Preclinical studies also demonstrate a putative role for CBD in the management of neuropathic pain.[16] Our finding that the higher rate of low THC:high CBD formulation use by noncancer patients and higher THC:CBD ratio use by cancer patients may be explained by these preclinical data supporting the use of CBD in neuropathic pain conditions, compared with the cancer patients whose pain may be more nociceptive. Cannabis-based medications are currently being studied with balanced formulations of THC:CBD showing efficacy in neuropathic pain syndromes, and high THC formulations being investigated for perioperative pain.[17] A few other possibilities may be that providers are more reluctant to give higher THC formulations for nonmalignant pain due to the psychoactive properties compared with patients with cancer based on negative societal perceptions.[18] Otherwise, patients may also be self-selecting for higher CBD forms in the nonmalignant population, as they may be more functional, working, and may not want the possibility of psychoactive side effects. More research is needed to better understand how different cannabis formulations of THC and CBD may benefit specific conditions or confer risks.

Our study also found differences in THC and CBD dosing over time between cancer and noncancer patients. While THC dose and THC:CBD ratio on average increased over time for all patients, cancer patients saw a slower increase in THC:CBD ratio over time. A possibility for the slower increase in cancer patients may be due to cancer patients being older than noncancer patients, and older adults may be more susceptible to adverse effects of rapid increases of THC, given its psychoactive properties. More research is needed to better understand the effects of precisely dosed medical cannabis products containing different THC and CBD formulations and how changes in these cannabinoids may benefit specific conditions or confer risks.

The cancer and noncancer populations also showed differences in their preferred route of administration. There was a higher use of the sublingual tincture among cancer patients, while the vaporization cartridge was the most common form used by noncancer patients. There may be several reasons for the higher use of sublingual tincture among cancer patients. The pharmacokinetics of the sublingual form results in a longer effect[19] compared with the inhaled preparation that could better treat the often constant, long-lasting symptoms many cancer patients experience. Inhaled cannabis could have negative effects on the lung especially in individuals with underlying lung disease such as asthma or chronic obstructive pulmonary disease,[20] and patients with lung cancer may be especially concerned about these risks. Finally, based on clinical practice, many older patients with cancer often do not have the dexterity or ability to manage the vaporization apparatus correctly (timing the button with inhalation), which may limit its use in this population.

There are several limitations in this study that should be noted. The patients included in this study are from one medical cannabis operator in New York State and, while large, and with the maximum number of dispensaries that New York State allows, are not representative of all patients using medical cannabis in New York State or the country. Second, it is common for patients to use multiple differing medical cannabis products on one invoice, often to see what product will work best for them. Therefore, we can only state what products patients purchased, and not what they used, and so, it is possible that patients used different products (dosing and/or formulations) at different times. Third, several key demographic data, including race/ethnicity, household income, and marital status, were not available or reliable for analysis, thereby limiting our understanding of demographic patterns of medical cannabis use. Likewise, we did not review detailed medical histories for patients and do not know the type of cancer patients had, which, given the diversity of types and severities of malignancies, further limits our understanding of medical cannabis use by patients with cancer. In addition, while a patient may meet criteria for medical cannabis by New York State law because of cancer, it does not specify they were using the cannabis for a cancer-related symptom, and could be using cannabis for an unrelated symptom (i.e., noncancer-related pain, anxiety, or insomnia). Therefore, medical cannabis use in this study of cancer patients may not be specific for cancer-related symptoms. Finally, this study focused only on THC and CBD ratios and concentrations, however, there are an additional 10 cannabinoids measured by Columbia Care LLC and are an area of future research.

In conclusion, our study uses primary data from a large medical cannabis licensee in New York State to provide demographic information of patients with cancer using medical cannabis products and how they differ from noncancer patients. We also describe differences in type, formulation, and dosing of medical cannabis for cancer patients compared with the noncancer population. Given the rapidly changing landscape of cannabis use in the United States, both medically and recreationally, this is a timely study that adds to the current scarcity of data on patterns of medical cannabis use by adults with cancer.

Author Disclosure Statement

No competing financial interests exist for all authors.

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