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An Observational Cross-Sectional Survey Exploring the Indications for and Responses to Medical Marijuana Use in Certified Patients in Pennsylvania

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Abstract

Introduction/Objectives: Medical cannabis programs across the country vary and differ in their qualifying conditions for medical cannabis use. This has led to a gap in knowledge regarding the specific needs of cannabis patients, including the most common reason patients seek medical cannabis. The purpose of this study was to examine the current needs of medical cannabis patients in order to better inform future research, and to evaluate potential needs in policy changes in states with more restrictive qualifying conditions for medical cannabis use. **Methods:** A cross-sectional survey study was administered (n = 207) at a Laurel Harvest Labs dispensary in Pennsylvania. Participants were qualified medical cannabis users and were recruited as a convenience sample when entering the dispensary. The survey asked questions regarding participant demographics, medical cannabis qualifying conditions, usage, methods of administration, adverse effects, tolerance, and impact of medical cannabis on medication, alcohol, and tobacco use. Chi-squared or Fisher's exact tests were conducted for analyses involving categorical data. **Results:** The mean age of respondents was 36.7 years (SD = 12.8), and the majority were male (61.4%) and white (84.7%). Respondents self-reported that anxiety disorder was the most common qualifying medical condition and the most common comorbid condition (50.1%; 69.3%) for medical cannabis use. Additionally, approximately 95% of users reported having no adverse effects from using medical cannabis, and 90% of users preferred inhalation through vaporization as the preferred method of consumption. More than 50% of participants reported an improvement in their symptoms where only 20% of users reported being tolerant to their current dose. More than 70% of respondents reported that obtaining medical cannabis was "easy" and 54% of users reported that the cost of medical cannabis was not a barrier to access. **Conclusions:** Anxiety disorder is a prevalent condition for which medical cannabis is used; however, many states do not recognize anxiety disorder as a qualifying condition for medical cannabis. Further research on medical cannabis use for anxiety disorders is needed to evaluate proper dosing and responses to treatment.

Keywords

medical marijuana, tetrahydrocannabinol, THC, cannabidiol, CBD, Pennsylvania, anxiety, symptom relief

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Introduction

In the United States, more than 50% of states have adopted policies that permit access to medical cannabis as a therapeutic agent. To date, a total of 36 states, and the District of Columbia, Puerto Rico, and the US Virgin Islands have comprehensive medical cannabis programs.[1] State-level cannabis laws and policies are often idiosyncratic and contradictory. Conditions that would qualify a patient for medical cannabis in 1 state may not qualify them in other states. For instance, Pennsylvania, North Dakota, New Jersey, and Puerto Rico list anxiety disorders as a qualifying condition, whereas other states do not. Each state's program defines its

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own methods of administration, dosage forms, potencies, and monthly allotments; all of which impacts the overall patient experience. There is a growing need to understand how and why patients use medical cannabis and whether all of their medical conditions are being addressed. Patients may receive a recommendation for a qualifying condition, but may instead be using cannabis to help with conditions that are not on an approved list within their state. The lack of uniformity of qualifying conditions across the country may confound survey research results.

Pennsylvania lists 23 vast and diverse qualifying (certifying) conditions for which medical cannabis may be recommended and used.[2] There are approximately 630 000 registered medical cannabis patients in Pennsylvania; however, the number of current active users is unknown. The most common disease process and/or symptom has not yet been defined. Several studies conducted in other states have found that chronic pain is the most common indication for medical cannabis use.[3-5] Patients also report a reduction in the use of other medications (most notably opioids) when using medical cannabis.[3,4,6-9] In 2011, researchers in California examined reasons for which patients utilized medical cannabis and found that pain, followed by insomnia and anxiety, were the top conditions that physicians recommended medical cannabis use.[10] A study conducted Florida found a reduction in the use of opioids and other pain-relieving medications while concomitantly using medical cannabis to treat their condition.[11] Researchers in other states have conducted exploratory and/or needs-based assessments specific to patients in their respective geographic locations, although the participants in these studies were not specifically certified medical cannabis patients[12,13] However, the results of these studies may not be representative of Pennsylvania patients as qualifying conditions are diverse and differ from other states.

Currently, the Pennsylvania Department of Health has certified 8 clinical registrants to participate in their innovative state approved research program for medical cannabis. In conjunction with the Lewis Katz School of Medicine at Temple University in Philadelphia, Laurel Harvest Labs (LHL) conducted their first study: a cross-sectional survey to examine the characteristics and use behaviors of medical cannabis patients, as well as examine substance use behaviors of pharmaceutical and non-pharmaceutical drugs, degree of relief from approved qualifying conditions, and perceptions of medical cannabis use. The goal of this exploratory, descriptive study was to help inform future research targeting the specific needs of cannabis patients, as well as potentially serve as an example for policy change in other states with more restrictive qualifying conditions.

This study was approved by an independent ethics committee and was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Written informed consent was obtained from all subjects prior to inclusion into the study.

Methods

Between June and July of the year 2021, a convenience sample of 207 (n = 207) patients were recruited through a LHL dispensary, where participants were screened for eligibility. Participants who met all inclusion/exclusion criteria and signed an informed consent form were asked to complete a 15-min online survey using an on-site electronic tablet. The inclusion and exclusion criteria for the study are available below.

The specific research objectives of this study were to provide an understanding for the most common medical conditions for which medical cannabis is used in this population, provide a benchmark for designing medical cannabis studies that target specific medical conditions, discover methods of consumption that are effective for the treatment of these conditions, determine effectiveness and acceptability (no adverse side effects) of medical cannabis for self-reported relief of symptoms, understand the impact of medical cannabis on the use of traditional medications (eg, pharmaceuticals) and tobacco and alcohol use, and determine if barriers to access medical cannabis exist.

The 54-item survey ranged from multiple-choice responses to free-text entry and included questions regarding participant demographics, medical cannabis qualifying conditions, usage, methods of administration, adverse effects, tolerance, and impact of medical cannabis on medication, alcohol, and tobacco use. At the conclusion of the survey, participants received a 15% discount to be applied to any future purchase in any of the LHL dispensaries.

Incomplete surveys (n = 5) were removed from the analysis. Survey data were summarized using descriptive statistics expressed as a mean (standard deviation [SD]) or median (interquartile range [IQR]) as appropriate for continuous variables, and as counts (percentage) for categorical variables. Chi-squared or Fisher's exact tests were conducted for analyses involving categorical data. A *P*-value less than .05 was considered statistically significant. Analyses were conducted in R version 4.0.1.

Inclusion Criteria

Subjects must have met all of the following inclusion criteria to participate in this study:

1. Subject is at least 21 years of age.
2. Subject is a certified medical cannabis patient in Pennsylvania.
3. Subject must be using medical cannabis for a qualifying condition for at least 1 month.

Exclusion Criteria

Any subject who met any of the exclusion criteria was excluded from participation in this study:

1. Subject is pregnant or lactating.
2. Subject is not a certified medical cannabis patient in Pennsylvania.
3. Subject is not using medical cannabis for a qualifying condition for at least 1 month.

Results

Demographics

A total of 207 individuals began the survey and 202 respondents completed the survey in full (97.6%). Demographic characteristics are summarized in Table 1. The mean age was 36.7 years (SD = 12.8), and the majority were male (61.4%) and white (84.7%). Approximately half of the respondents had either a bachelor's degree (25.7%) or completed some college with no degree (25.7%), while another 19.3% had graduated high school. The majority of respondents stated that they were employed (74.8%), while 6.9% stated that they were "out of work and looking for work" and another 6.9% were students. The average number of medical diagnoses reported by the respondents was 2.5.

Table 1. Characteristics of 202 Subjects Who Completed the Questionnaire to Understand Ingestion of Cannabis.

Characteristic	Mean (SD) or n (%)
Age	36.7 (12.8)
Gender	
Male	124 (61.4%)
Female	75 (37.1%)
Non-binary	3 (1.5%)
Transgender male	0 (0%)
Transgender female	0 (0%)
Prefer not to answer	0 (0%)
BMI	29.3 (31.4)
Race	
White/Caucasian	171 (84.7%)
Black/African American	14 (6.9%)
Asian	9 (4.5%)
Native American/Alaska Native	1 (0.5%)
Hawaiian/Pacific Islander	0 (0%)
Prefer not to answer	12 (5.9%)
Ethnicity	
Hispanic	12 (5.9%)
Non-Hispanic	190 (94.1%)
Education	
Less than ninth grade	0 (0%)
9th-12th grade, no diploma	5 (2.5%)
High school graduate/GED	39 (19.3%)
Some college-no degree	52 (25.7%)
Associate's degree (AA, AS)	23 (11.4%)
Bachelor's degree	52 (25.7%)
Graduate or professional degree	25 (12.4%)
Vocational degree	6 (3.0%)
Employment	
Employed	151 (74.8%)
Out of work and looking for work	14 (6.9%)
Out of work but not currently looking for work	1 (0.5%)
A student	14 (6.9%)
Retired	9 (4.5%)
Unable to work	13 (6.4%)
Income	
Less than $14 999	10 (5.0%)
$15 000-$24 999	10 (5.0%)
$25 000-$34 999	20 (9.9%)
$35 000-$49 999	35 (17.3%)
$50 000-$74 999	37 (18.3%)
$75 000-$99 999	24 (11.9%)
$100K+	32 (15.8%)
Prefer not to say	34 (16.8%)
Number of medical diagnoses	2.5 (1.9)

Abbreviations: BMI, body mass index; SD, standard deviation.

Qualifying Medical Conditions

Anxiety disorder was the most common primary reason for medical cannabis certification (50.1%; Table 2), followed by severe chronic or intractable pain (22.3%) and post-traumatic stress disorder (PTSD; 7.9%). Anxiety disorder was also the most commonly reported comorbid condition (69.3%), followed by PTSD (25.7%) and severe chronic or intractable pain (25.7%). The mean number of conditions reported for treatment with medical cannabis was 2.3 (SD = 3.7). Additionally, of the 202 participants in the study, 137 reported having experienced some form of pain that is not necessarily related to their primary/comorbid condition. Of these 137 who reported some form of pain, the most commonly reported type of pain was back/neck pain (60.6%), followed by headaches/migraines (32.1%), arthritis pain (30.6%), and neuropathic pain (23.3%).

Medical Cannabis Use

Medical cannabis use data are summarized in Table 3. Prior to medical certification, 62.4% of respondents used cannabis recreationally, 21.3% self-prescribed it for a medical condition, and 8.9% did not use cannabis prior to certification. On average, respondents had used medical cannabis for their condition for 54.5 months (approximately 4.5 years), with 59.4% stating that they use it "several times a day" and 24.8% using it "6-7 days a week." The cannabis strain profiles that were most frequently reported as being the most effective were THC alone (39.1%) and THC-dominant (36.6%) products; CBD-dominant (2.5%) and CBD alone (1.0%) were the least frequently reported strains. The most

Table 2. Medical Conditions of 202 Subjects Who Completed the Questionnaire to Understand Ingestion of Cannabis.

Condition	n (%) or mean (SD)
Primary condition for certification	
Anxiety disorders	102 (50.1%)
Severe chronic or intractable pain	45 (22.3%)
Post-traumatic stress disorder	16 (7.9%)
Inflammatory bowel disease	6 (3.0%)
Neuropathies	6 (3.0%)
Crohn's disease	4 (2.0%)
Opioid use disorder	4 (2.0%)
Central nervous system damage	3 (1.5%)
Neurodegenerative diseases	3 (1.5%)
Insomnia	3 (1.5%)
Autism	1 (0.5%)
Epilepsy	1 (0.5%)
Glaucoma	1 (0.5%)
Multiple sclerosis	1 (0.5%)
Terminal illness	1 (0.5%)
Tourette syndrome	1 (0.5%)
Prefer not to answer	4 (2.0%)
Comorbid conditions	
Anxiety disorders	140 (69.3%)
Post-traumatic stress disorder	52 (25.7%)
Severe chronic or intractable pain	52 (25.7%)
Opioid use disorder	21 (10.4%)
Inflammatory bowel disease	20 (9.9%)
Central nervous system damage	17 (8.4%)
Neuropathies	17 (8.4%)
Cancer, including remission therapy	12 (5.9%)
Glaucoma	12 (5.9%)
Neurodegenerative diseases	11 (5.4%)
Crohn's disease	9 (4.5%)
Multiple sclerosis	9 (4.5%)
Terminal illness	8 (4.0%)
Autism	7 (3.5%)
Epilepsy	7 (3.5%)
Intractable seizures	7 (3.5%)
Tourette syndrome	7 (3.5%)
HIV/AIDS	6 (3.0%)
Parkinson's disease	6 (3.0%)
Amyotrophic lateral sclerosis	5 (2.5%)
Dyskinetic and spastic movement disorders	5 (2.5%)
Huntington's disease	5 (2.5%)
Insomnia	5 (2.5%)
Sickle cell anemia	5 (2.5%)
Depression	3 (1.5%)
No comorbid conditions	3 (1.5%)
Attention deficit disorder	1 (0.5%)
Prefer not to answer	12 (5.9%)
Number of conditions reported for treatment with medical cannabis	2.3 (3.7)
Reporting medical cannabis use to treat pain	N = 137
Back/neck	83 (60.6%)
Headache/migraine	44 (32.1%)
Arthritis pain	42 (30.6%)
Neuropathic (nerve pain)	32 (23.3%)
Trauma/injury	26 (19.0%)
Chronic pain following surgery	22 (16.1%)
Abdominal	20 (14.6%)
Menstrual pain	15 (10.9%)
Orthopedic pain	7 (5.1%)
Muscle pain	2 (1.5%)
Non-specific pain	2 (1.5%)
Chronic pancreatitis	1 (0.7%)
Endometriosis	1 (0.7%)
Groin hernia	1 (0.7%)
Sarcoidosis	1 (0.7%)
Cancer	1 (0.7%)

Abbreviations: AIDS, Acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; SD, standard deviation.

preferred modes of medical cannabis delivery were vaporized oils/concentrates (48.0%) and vaporized whole flowers (41.6%). Additionally, 38.1% of respondents stated that hybrid (indica and sativa) strains worked best for them, while 32.2% and 15.3% indicated that indica-dominant and sativa-dominant strains, respectively, worked best for them.

Tolerance

Sixty-two respondents (30.7%) stated that they "need about the same" amount of cannabis as when they started, while another 25.2% stated that they now "need a little more" and 8.4% stating that they now "need much more." With regards to tolerance to medical cannabis, 40.1% said "yes, but dose, ingestion method, or strain changed," 23.3% said "yes, but dose, ingestion method, and strain unchanged," and 36.6% stating that they have not developed a tolerance to medical cannabis.

Effectiveness and Side Effects

On a scale of 0% to 100%, where 0% represents no improvement and 100% represents complete resolution of symptoms, respondents reported an average of 79.2% improvement in their symptoms (Table 4) with medical cannabis use. In addition, 74.8% stated that medical cannabis also helped with their anxiety, 72.8% said it also helped with their sleep quality, and 60.4% stated that it also helped with their depression/mood. Over half of the respondents

Table 3. Medical Cannabis Use by 202 Subjects Who Completed the Questionnaire to Understand Ingestion of Cannabis.

Characteristic	Subjects (N = 202) n (%) or mean (SD)
Cannabis use prior to certification	
No	18 (8.9%)
Yes, recreationally	126 (62.4%)
Yes, self-prescribed for a medical condition	43 (21.3%)
Prefer not to answer	15 (7.4%)
Duration of use of medical cannabis for condition (months)	54.5 (99.3)
Frequency of use	
Several times a day	120 (59.4%)
6-7 days a week	50 (24.8%)
3-5 days a week	19 (9.4%)
1-2 days a week	5 (2.5%)
Less than weekly	8 (4.0%)
Strain profile of most effective product	
CBD alone	2 (1.0%)
THC alone	79 (39.1%)
CBD dominant	5 (2.5%)
THC dominant	74 (36.6%)
CBD/THC in equal amounts	19 (9.4%)
Unknown	23 (11.4%)
Preferred mode of delivery	
Smoke—whole flower	4 (2.0%)
Vaporize—whole flower	84 (41.6%)
Vaporize—oils/concentrates	97 (48.0%)
Oral (something swallowed)	9 (4.4%)
Tincture (under tongue)	5 (2.5%)
Topical (on the skin)	2 (1.0%)
Spray in mouth	1 (0.5%)
For the condition for which you use medical cannabis, what type of medical cannabis works best for you?	
Cannabis sativa dominant strains	31 (15.3%)
Cannabis indica dominant strains	65 (32.2%)
Hybrid (indica and sativa) strains	77 (38.1%)
Unknown	28 (13.9%)
Prefer not to answer	1 (0.5%)
Cannabis use over time	
I need much more now than when I started	17 (8.4%)
I need a little more now than when I started	51 (25.2%)
I need about the same as when I started	62 (30.7%)
I need a little less now than when I started	9 (4.5%)
I need much less now than when I started	7 (3.5%)
My use changes depending on my condition	43 (21.3%)
Only used cannabis for short time	13 (6.4%)
Average time to find the correct medical cannabis product (days)	226.6 (1200.7)
Tolerance to medical cannabis	N = 202
No	74 (36.6%)
Yes, but dose, ingestion methods, and strain unchanged	47 (23.3%)
Yes, but dose, ingestion method, or strain changed	81 (40.1%)

Abbreviation: SD, standard deviation.

(59.4%) stated that they stopped using medical cannabis and their symptoms returned. When asked how cannabis compares to other medicines in providing relief for their qualifying condition, 48.5% of respondents stated that medical cannabis "works much better" and 16.8% said that it "works a bit better," with 21.3% stating that cannabis is the only medicine or product that gives them relief for their symptoms.

In terms of adverse effects, 11 respondents (5.5%) reported having negative or unwanted effects from cannabis. Of those reporting side effects, the most frequently reported were anxiety/nervousness/paranoia, changes in perception or memory problems, concentration problems, mood changes, and nausea/vomiting, and the mean number of reported side effects was 2.8. Additionally, 81.2% of respondents stated that they did not limit their use of medical cannabis due to side effects, while 2.5% said that their use of medical cannabis is still limited by side effects. Compared to other medications, 58.9% stated that they have "no undesirable effects from cannabis," 28.2% said that "other medicines produce much worse effects than cannabis," and 6.9% stated that "other medicines produce somewhat worse effects than cannabis"; 2.0% and 0% said that cannabis produced "somewhat worse" and "much worse," respectively, effects than other medicines.

Impact on Medications, Alcohol, and Tobacco

The results of the chi-square analyses examining the association between the strain profile reported to be the most effective and changes in medication, alcohol, and tobacco use are shown in Table 5. The analyses revealed no statistically significant findings.

Use of Alcohol and Tobacco

Participants were asked how often they consumed alcohol and tobacco. A majority of participants (N = 133, 66%) reported using alcohol, and of those that drink, 7 (5%) reported daily use, 47 (35%) reported having a few drinks a week, 33 (25%) reported having 1 drink a week, and 46 (35%) reported having 1 drink a month. Of the participants who reported alcohol use and medical cannabis use, 72 (56%) reported no change in alcohol consumption, 56 (44%) reported consuming less alcohol, and 0 reported consuming more alcohol.

A minority of participants (N = 65, 32%) reported tobacco consumption, and of those that consume tobacco, 42 (65%) reported daily use, 14 (6%) reported consuming tobacco a few times a week, 6 (9%) reported once a week, and 3 (4.6%) reported once a month. Of the participants who reported tobacco use and medical cannabis use, 27 (44%) reported no change in tobacco consumption, 27 (44%) reported

Table 4. Perceived Effectiveness and Side Effects of Medical Cannabis Use.

	Subjects (N = 202)
	n (%) or mean (SD)
Perceived improvement of symptoms (%)	79.2 (18.0)
Improvement of other conditions	
Anxiety	151 (74.8%)
Appetite stimulant	77 (38.1%)
Concentration (ADD/ADHD)	65 (32.2%)
Depression/mood	122 (60.4%)
Other substance cravings (nicotine, alcohol, or other)	42 (20.8%)
Pain	108 (53.5%)
Restless legs	43 (21.3%)
Sleep quality	147 (72.8%)
None	4 (2.0%)
Other	10 (5.0%)
The number and percent of subjects reporting having their symptoms return when they stopped using medical cannabis.	120 (59.4%)
Relief of conditions from cannabis compared to other medicines	
Other medicines work much better than cannabis	0 (0%)
Other medicines work a bit better than cannabis	12 (5.9%)
Other medicines work about the same as cannabis	5 (7.4%)
Cannabis works a bit better than other medicines	34 (16.8%)
Cannabis works much better than other medicines	98 (48.5%)
Only cannabis gives me relief from my condition	43 (21.3%)
Subjects reporting negative or unwanted side effects	11 (5.5%)
Commonly reported side effects	N = 11
Anxiety/nervousness/paranoia	4 (36.4%)
Asthma or breathing problems	2 (18.2%)
Changes in perception or memory problems	4 (36.4%)
Chest pain	2 (18.2%)
Concentration problems	3 (27.3%)
Decline in motivation, productivity, or activity	2 (18.2%)
Mood changes	3 (27.3%)
Nausea/vomiting	3 (27.3%)
Rapid heartbeat/palpitations	2 (18.2%)
Sleep changes	2 (18.2%)
Weight gain that was not wanted	1 (9.1%)
Dry mouth	2 (18.2%)
Headaches/dizziness	1 (9.1%)
Number of side effects reported	N = 11
	2.8 (2.7)
Subjects limiting use due to side effects	
No	164 (81.2%)
Yes, but not any more	11 (5.5%)
Yes, and it still is limited by side effects	5 (2.5%)
Unknown	22 (10.9%)
Perception of side effects of medical cannabis compared to other medications	
Cannabis produced much worse effects than other medicines	0 (0%)
Cannabis produced somewhat worse effects than other medicines	4 (2.0%)
Undesired effects about the same with cannabis and other medicines	8 (4.0%)
Other medicines produced somewhat worse effects than cannabis	14 (6.9%)
Other medicines produced much worse effects than cannabis	57 (28.2%)
No undesirable effects from cannabis	119 (58.9%)

Abbreviation: SD, standard deviation.

consuming less tobacco, and 8 (13%) reported consuming more tobacco.

Barriers to Accessing Medical Cannabis

Seventy-seven (38.1%) and 68 (33.7%) respondents stated that it is "very easy" and "easy," respectively, to obtain medical cannabis in Pennsylvania (Table 6). Of those reporting that it was "difficult" or "very difficult" (11 respondents) to obtain medical cannabis, 63.6% indicated that it was difficult obtaining the card and 45.5% stated that it was difficult locating a healthcare professional to write a recommendation. In terms of the cost of medical cannabis, 32.2% said it was a "minor problem," 25.7% said it was a "moderate problem," and 20.3% said it was a "severe problem," while 21.8% stated it was "not a concern."

Discussion

The purpose of this survey study was to investigate the reasons for which Pennsylvania medical cannabis patients use cannabis. This cross-sectional survey study evaluated the responses of 202 (n = 202) medical cannabis patients visiting a single dispensary. The most interesting finding was that anxiety disorder was the most commonly reported qualifying condition for which medical cannabis was both recommended and used. This response was not expected as chronic and severe pain is historically reported as the most common reason for cannabis recommendation and use.[3-5] Compared to other studies, this study was the first survey to show that anxiety as a primary indication was the number one reason for qualifying as a medical cannabis patient. An anonymous online survey of 1492 participations was distributed in 2016 in Washington State to understand the rationale for cannabis use and found that pain was the number one indication for cannabis use, closely followed by anxiety.[9] In 2019, a retrospective meta-analysis examining patient self-reported utilization in the US and other countries found that anxiety was second to pain.[14] With this information, it is difficult to make broad assumptions about the current study as the number of participants was small (N = 202). However, this study revealed that mental health issues and the use of medical cannabis for the treatment of such cannot be ignored. Especially since most medical cannabis states in the US still do not permit anxiety or other mental health issues as a qualifying condition.

Although patients reported pain as the second most prevalent reason for cannabis recommendation and use, the number of responders who received a recommendation for and used cannabis for treatment of anxiety overwhelmingly surpassed the numbers of participants who used cannabis for pain (Table 2). Additionally, anxiety was the number one comorbid condition reported for those whose qualifying condition was chronic or severe pain. This finding may be due to the fact that most states do not include anxiety

Table 5. Reported Impact of Medical Cannabis on Medications, Alcohol, and Tobacco Use.

Medication/product	Using more	No change n (%)	Using less n (%)	*P* value n (%)
Alcohol (n, % in group) N = 116				
CBD alone	0 (0%)	0 (0%)	0 (0%)	.482
THC alone	0 (0%)	32 (59.3%)	22 (40.7%)	
CBD dominant	0 (0%)	1 (50.0%)	1 (50.0%)	
THC dominant	0 (0%)	28 (62.2%)	17 (37.8%)	
CBD/THC in equal amounts	0 (0%)	6 (40.0%)	9 (60.0%)	
Tobacco (n, % in group) N = 53				
CBD alone	0 (0%)	0 (0%)	0 (0%)	.745
THC alone	5 (21.7%)	9 (39.1%)	9 (39.1%)	
CBD dominant	0 (0%)	0 (0%)	1 (100.0%)	
THC dominant	3 (10.7%)	13 (46.4%)	12 (42.9%)	
CBD/THC in equal amounts	0 (0%)	1 (100.0%)	0 (0%)	
Opioid pain medications (n, % in group) N = 12				
CBD alone	0 (0%)	0 (0%)	0 (0%)	.056
THC alone	1 (25.0%)	2 (50.0%)	1 (25.0%)	
CBD dominant	0 (0%)	0 (0%)	0 (0%)	
THC dominant	1 (14.3%)	0 (0%)	6 (85.7%)	
CBD/THC in equal amounts	0 (0%)	1 (100.0%)	0 (0%)	
Anxiety medications (n, % in group) N = 35				
CBD alone	0 (0%)	1 (100.0%)	0 (0%)	.755
THC alone	2 (12.5%)	9 (56.3%)	5 (31.3%)	
CBD dominant	0 (0%)	1 (50.0%)	1 (50.0%)	
THC dominant	1 (11.1%)	5 (55.6%)	3 (33.3%)	
CBD/THC in equal amounts	0 (0%)	2 (28.6%)	5 (71.4%)	
Sleep medications (n, % in group) N = 40				
CBD alone	1 (50.0%)	0 (0%)	1 (50.0%)	.063
THC alone	3 (21.4%)	6 (42.9%)	5 (35.7%)	
CBD dominant	0 (0%)	0 (0%)	0 (0%)	
THC dominant	0 (0%)	4 (22.2%)	14 (77.8%)	
CBD/THC in equal amounts	0 (0%)	2 (33.3%)	4 (66.7%)	
Depression medications (n, % in group) N = 45				
CBD alone	0 (0%)	0 (0%)	1 (100.0%)	.276
THC alone	0 (0%)	13 (68.4%)	6 (31.6%)	
CBD dominant	0 (0%)	0 (0%)	0 (0%)	
THC dominant	0 (0%)	11 (61.1%)	7 (38.9%)	
CBD/THC in equal amounts	1 (14.3%)	3 (42.9%)	3 (42.9%)	
Migraine or headache medications (n, % in group) N = 27				
CBD alone	0 (0%)	0 (0%)	1 (100.0%)	.942
THC alone	0 (0%)	2 (33.3%)	4 (66.7%)	
CBD dominant	0 (0%)	0 (0%)	1 (100.0%)	
THC dominant	2 (15.4%)	2 (15.4%)	9 (69.2%)	
CBD/THC in equal amounts	1 (16.7%)	1 (16.7%)	4 (66.7%)	

disorders as a qualifying condition for which medical cannabis can be recommended. The COVID-19 pandemic and/or other major life stressors may have also contributed to the reason anxiety disorders were the most prevalent condition. Our findings support that further research is warranted to assess medical cannabis use for anxiety disorders.

Our findings showed that approximately 90% of responders in our sample used inhalation through vaporization as the preferred method of consumption. However, it is important to note that at the time of this study, smoking or igniting cannabis flowers is not an approved method of administration in Pennsylvania, which explains why vaporization was

Table 6. Reported Barriers to Accessing Medical Cannabis in PA.

	n (%)
Perceived difficulty obtaining medical cannabis in PA	
Very difficult	3 (1.5%)
Difficult	8 (4.0%)
Neutral	46 (22.8%)
Easy	68 (33.7%)
Very easy	77 (38.1%)
Factors influencing difficulty	N = 11
Obtaining the card	7 (63.6%)
Locating a health care professional to write a recommendation	5 (45.5%)
Finding a dispensary	0 (0%)
Problem with the cost of medical cannabis	
Not a concern	44 (21.8%)
Minor problem	65 (32.2%)
Moderate problem	52 (25.7%)
Severe problem	41 (20.3%)

the most commonly reported method of inhalation. This response needs to be explored to understand why inhalation is the preferred method of administration. It is known that inhalation of cannabinoids offers an immediate onset of action.[15] Perhaps this is desirable to treat an acute and/or episodic condition, for example, an acute anxiety attack. Also, inhalation of cannabis is traditionally more familiar as compared with other methods of consuming cannabis, such as tinctures or oral ingestibles. These other dosage forms have only been made available to patients in legal cannabis states. Patients may only accept these alternatives through education of the available options. Further research is needed to explore if other modes of administration would be an acceptable dosing method if the onset of action were to approximate inhalation.

Approximately 95% of participants denied experiencing any adverse effects from using medical cannabis. This is particularly important considering that tetrahydrocannabinol (THC) is known to cause, or contribute to, anxiety feelings when consumed in higher doses[16]; yet, in this study, there was a successful reduction in anxiety symptoms reported by patients. Perhaps this is because Pennsylvania uses a pharmacist model where patients have the opportunity to discuss medical cannabis dosing and use with a licensed pharmacist and thereby potentially reducing the chance of overconsumption. The lack of adverse effects may also be explained by the fact that medical cannabis patients surveyed were experienced consumers. Over 90% of participants in this study reported being previous cannabis consumers prior to becoming patients (Table 4). It is important to note that Table 4 also highlights that a majority of respondents (65.3%) claimed that medical cannabis works better than traditional medications for their medical condition, and an additional 21.3% of respondents reported that cannabis is the only medicine that gives them relief of their symptoms. Another study with a larger participation group and from more diverse geographic locations may substantiate this finding.

The majority of patients reported that medical cannabis was effective in treating their medical condition. Approximately 80% of the responders either maintained or altered their medical cannabis use, strain or administration method to effectively treat their medical condition. This is compared to only 20% who reported being tolerant to the benefits of medical cannabis treatment (Table 5). Interestingly, these patients still maintained their dose, strain, and method of administration and continued to use medical cannabis despite reporting tolerance. Perhaps the responders in the 20% category answered the question prior to having the opportunity to discuss their cannabis use response with the dispensary pharmacist to be guided with changes in their dose, strain, or method of administration. Additionally, there was no statistically significant difference in medical cannabis strain use, highlighting that strain use did not play a role in changing other drug utilization in medical cannabis patients. A follow up study examining patients who specifically use alcohol, tobacco, and/or opioids, or additional medical treatments of interest should be performed, to learn if medical cannabis use alters the utilization of these other substances.

Regarding barriers to access, over 70% of respondents reported that it was "easy" or "very easy" to obtain medical cannabis. They stated that it was not difficult to find a recommending physician, obtain a medical cannabis card, or find a dispensary (Table 6). Fifty-four percent (54%) of responders did not think medical cannabis was too expensive or that the price was a barrier for them to participate in the program, whereas 20% of respondents believed the cost of medical cannabis is a severe problem and a barrier to access. This may be due to the location of the dispensary, where approximately 80% of the survey respondents reported earning over $35 000 a year, and 30% of responders reported earning over $50 000 a year. Access to medical cannabis would need to be examined more broadly, questioning more participants from a diverse geographic and financial background.

This survey study revealed several important pieces of information regarding medical cannabis use in patients within a state with a comprehensive list of qualifying conditions; however, there are some limitations. This observational study was conducted at a single geographic location and the results may not be reflective of all medical cannabis patients. Additionally, this survey study utilized convenience sampling methods, whereby participants were

recruited at a single location, and the sample size of the study was small. Furthermore, this study collected data at a single point in time, when the participant arrived at the dispensary, and therefore it is challenging to compare changes in responses unless more than 1 survey is administered at additional time points. Future studies will consider targeting more participants from various geographic locations and economic backgrounds across a series of time intervals to understand the utilization, administration, and efficacy of cannabis as medicine.

Conclusions

Anxiety disorders were the most common reason for which patients received a recommendation, and used, medical cannabis. Moreover, there was a de minimis of adverse effects reported amongst the sample population. Finally, inhalation was the dosing method of choice for the majority of responders, which may be influenced by state restrictions on smoking whole flower. This study was to examine medical cannabis use in a state with broad qualifying conditions. Our findings show that anxiety disorder is a prevalent condition for which medical cannabis is used. Further research is needed to specifically target and evaluate medical cannabis dosing, formulation, method of administration, and responses for the treatment of anxiety disorders.

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Author Contributions

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Ethics Approval and Consent to Participate

The ethics committee that approved this study protocol, informed consent form, and questionnaire is Allendale Institutional Review Board (AIRB). All participants provided informed consent prior to study participation.

Consent for Participation

Not Applicable.

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Availability of Data and Materials

All data generated or analyzed during this study are included in this published article.

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