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Marijuana Use for Symptom Control in Inflammatory Bowel Disease: Patients' Perceptions and Patterns of Use

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Short Title: Marijuana in IBD: Patient Reported Outcomes

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Abstract

Introduction: Many patients with Inflammatory Bowel Disease (IBD) use marijuana for disease-related symptoms. Data regarding reasons for usage, impact, and perceptions on its effects is lacking. Our study aims to understand patterns of marijuana use, underlying symptom response, and beliefs about marijuana in patients with IBD.

Methods: An anonymous REDCap survey comprised of 39 questions on demographics, disease features, patterns of marijuana use, symptoms, quality of life, and true/false statements about marijuana was administered to 108 participants recruited from University of Florida (UF) IBD clinic.

Results: Participants were 47.2% male and 51.9% female. While a significant percentage of subjects reported co-morbid depression/anxiety (61.1%), the percentages for PTSD and ADHD are both 19.4%. Patient characteristics are compared among three reasons of marijuana use (Recreational, Medical and Combination). There was a notable shift in reasons for use with both age (p = 0.0074) and duration of IBD diagnosis (p = 0.006).: recreational use is more common among younger patients and those with a shorter duration of IBD diagnosis, medical use becomes predominant in middle-aged patients and those with an intermediate duration of diagnosis, and combination use increases among older patients and those with the longest duration of IBD diagnosis. Comparisons are also conducted based on the frequency of Marijuana usage. Associations were found between marijuana use frequency and symptom relief. Daily or near-daily marijuana use was associated with self-reported relief of nausea/vomiting (82.1%; p=0.003), arthralgias (81%; p=0.013), and insomnia (80%; p=0.02). Additionally, marijuana use was linked to an improved ability to live independently (p=0.0075) and current employment (p=0.04). Patients with a history of bowel surgery were more likely to report marijuana use lasting longer than five years (OR 21.94, CI [2.91, 250.18], p=0.0059) and using marijuana at least once weekly (OR 11.13, CI [1.78, 97.69], p=0.0163). Notably, 59.3% of respondents believed marijuana use had reduced their opioid consumption. Marijuana users with a history of IBD-related hospitalization had higher odds of reporting depression/anxiety (OR 14.3, CI [2.34,143.2], p=0.009) and diarrhea symptoms (OR 13.3, CI [2.2,128.9], p=0.01). When asked how marijuana use affected their ability to live independently, 61.3% of participants reported “improved”. Similarly, 87.6% respondents reported improvement in their quality of life with marijuana use.

Conclusions: Marijuana can be helpful for symptom control and reducing the reliance on pharmaceuticals and may improve quality of life in patients with IBD. Participants demonstrated good insight regarding the role of marijuana in the management of their disease.

Introduction

Inflammatory Bowel Disease (IBD) is a chronic, inflammatory autoimmune disease with a relapsing and remitting course. It comprises two phenotypes, Crohn's Disease (CD) and Ulcerative Colitis (UC)[1]. Patients can experience debilitating symptoms including abdominal pain, nausea, weight loss, bloody bowel movements, poor appetite, and sleep, all of which can impact patient quality of life (QOL)[1]. Over time, complications such as severe uncontrolled UC, bowel strictures and fistulas associated with CD, or bowel malignancy can lead to the need for surgical resection. Immunosuppressive medications are the mainstay of therapy with the target of mucosal healing of the bowel[2]. Despite the beneficial effects of these medications, disease-related symptoms persist in many patients, affecting their QOL. These medications themselves can also cause side effects such as nausea, insomnia, and loss of appetite[3]. Patients struggle with a variety of symptoms due to the compounded physical, emotional, and psychological burden of the disease[4].

Use of medical and recreational marijuana has increased in the United States (US) following its legalization in 38 of 50 states for medicinal use and 24 states for recreational use[5]. Patients with IBD sometimes use marijuana for disease related symptoms[6]. Previous studies have examined characteristics of marijuana use and their associated patterns of symptom relief in patients with IBD[7]. Among the few clinical trials examining marijuana use in IBD, data suggests overall improvement in quality-of-life scores, with minimal efficacy in reducing inflammatory markers or achieving disease remission[8,7].

Medical marijuana and its derivatives have become increasingly popular in the U.S. for management of chronic pain and anxiety. Inadequate pain control in IBD often leads to chronic narcotic use, which has the added risk of developing dependence[9]. This makes marijuana a promising alternative for symptom management. Patients with IBD report marijuana use for management of both gastrointestinal and non-gastrointestinal symptoms such as diarrhea, nausea/vomiting, bloody stool, fatigue, fever/chills, joint pain, insomnia, anxiety, poor appetite, and weight loss, which may persist even in the setting of endoscopic remission[8]. Crohn's Disease is also an approved indication for medical marijuana in the state of Florida. There is a paucity of data on patterns of marijuana use and disease outcomes in IBD patients, particularly in the young adult population, and hence limited information regarding the risks and benefits. Our study aims to assess the attitudes, modes, profiles, and impact of medical marijuana use in IBD patients via survey tools. We will address a key knowledge gap on the factors encouraging or deterring marijuana use by patients with IBD, their patterns of use, impact on prescription medication use, QOL, and activities of daily living.

Methods

An anonymous survey was administered via REDCap to participants who were recruited from the University of Florida (UF) IBD clinic. Eligible participants carried a diagnosis of Crohn's Disease (CD) or Ulcerative Colitis (UC) in addition to self-reported marijuana use (medical, recreational, or a combination of medical and recreational). Survey questions were adapted from the International Cannabis Policy Study survey to be specific to the needs of IBD patients.[10] The administered survey consisted of 39 questions on demographics, disease features, patterns of marijuana use, perceived effect of marijuana on disease symptoms, perceived effect of marijuana on quality of life, and true/false statements about marijuana (supplementary table 1). 108 study subjects completed the survey. Summary statistics from the survey responses were stratified by diagnosis, hospitalization, IBD-related complications, patterns of marijuana usage, and perceived outcomes. As appropriate, Wilcoxon-Mann-Whitney tests and Kruskal-Wallis Rank Sum tests were used for continuous variables, and Pearson's Chi-squared tests and Fisher's exact tests were used for categorical variables. Logistic regressions were used to investigate patterns of marijuana use, frequency of hospitalization, and incidence of bowel surgery. Proportional odds logistic regression was used to assess the relationship between patterns of marijuana use and perceived improvement in symptoms.

Ethical Considerations

Patient participation was entirely voluntary, and survey information was completely anonymous, thus protecting participants from any potential consequences of reporting marijuana usage to our study including legal or social. Marijuana legalization remains a topic of legal debate in the United States, and results of the survey can potentially play a role in patient advocacy.

Results

A total of 108 subjects completed the survey. Subject demographics are outlined in Table 1a. Survey participants were 47.2% male and 51.9% female, with one unreported gender. The age distribution was 13.9% for 17-25 years, 50% for 26-45 years, 26.9% for 46-65 years, and 9.3% for those older than 65 years. While a significant number of participants reported being diagnosed by a physician with Depression/Anxiety (61.1%), the percentages for ADD/ADHD and PTSD are both 19.4%. Daily or almost daily use was reported by 68.3% of participants (Table 1b).

Among surveyed participants, 79.6% reported a diagnosis of CD, and 20.4% UC. Regarding treatment, 82.4% reported current IBD treatment, with 56.5% reporting active use of biologics (Table 1c). Patient characteristics are compared among three reasons of marijuana use (Recreational, Medical and Combination). The majority (61.9%) of survey participants reported medical marijuana use (versus recreational or combination use). There was a notable shift in reasons for use with both age (p = 0.0074) and duration of IBD diagnosis (p = 0.006): recreational use is more common among younger patients and those with a shorter duration of IBD diagnosis, medical use becomes predominant in middle-aged patients and those with an intermediate duration of diagnosis, and combination use increases among older patients and those with the longest duration of IBD diagnosis. Methods of marijuana use varied by gender, with women using more oral non-edibles (25%) and men using smoking (62.7%) more (p=0.011). Tables 2a, 2b, and 2c outline respondent's reasons for marijuana use, along with its impact. Anxiety (60.2%) was the most common symptom for which marijuana was used, followed closely by joint pains (54.6%) and nausea/vomiting (53.7%). The frequency of marijuana use was associated with symptoms. Daily or near-daily marijuana use was associated with self-reported relief of nausea/vomiting (82.1%; p=0.003), arthralgias (81%; p=0.013), and insomnia (80%; p=0.02). Daily or almost daily marijuana use was also associated with a self-reported improved ability to live independently (p=0.0075) and current employment status (p=0.04). When asked how marijuana use affected their ability to live independently, 61.3% of participants reported "improved". Similarly, 87.6% respondents reported improvement in their quality of life with marijuana use. Regarding monthly medical marijuana costs, 43.7% reported costs <$100, and 28.7% reported costs between $101 and $300. Only 8 participants (9.1%) reported adverse side effects of medical marijuana use, with 2 of them needing hospitalization due to this.

Perceptions on marijuana use are outlined in Figure 1. When presented with a series of true/false statements regarding marijuana use and IBD, 88% of respondents agreed that "marijuana helps with symptoms related to IBD". Additionally, a majority (59.3%) of respondents believed that marijuana use was reducing their use of opioid or narcotic pain medications, while 67.6% believed that it was not improving gut inflammation. Some participants (28.7%) were initially hesitant to start medical marijuana, primarily citing legal and cognitive concerns (Figure 2A and 2B). Legalization played a role in the decision to begin medical marijuana use for 55.7% of respondents (Figure 2C). A significant percentage (89.5%) felt comfortable telling their health care providers that they use marijuana, particularly their physicians (97.9%). Only a small number of participants (23 or 24.5%) were informed about possible drug-drug interactions related to marijuana use. Participants were more likely to be comfortable disclosing that they use marijuana to their family and friends (92.2% and 90%) compared to their peers and co-workers (36.7%).

Data from the logistic regression analysis is shown in Table 3. Participants with a history of bowel surgery had significantly higher odds of using marijuana for more than 5 years (OR 21.94, CI [2.91, 250.18], p=0.0059) and of using marijuana once or more times monthly (OR 11.13, CI [1.78, 97.69], p=0.0163). Marijuana users with a history of hospitalization for IBD had higher odds of having depression/anxiety (OR 14.4, CI [2.34,143.2] p=0.009) and diarrhea symptoms (OR 13.3, CI [2.2,129.0] p=0.01). Additionally, combination marijuana use (OR 9.58, CI [1.56, 66.25] p=0.0199) at a frequency of once or more per month (OR 0.08 CI [0.01, 0.59], p=0.0157) was associated with greater odds of self-reported symptom improvement.

Discussion

Patients with IBD are a unique population who sometimes rely on marijuana for management of their debilitating disease related symptoms. There is a significant lack of patient reported outcomes and real-world data on safety and efficacy of marijuana use in this population. Patients in this situation often look upon their physicians for reliable answers to their questions and concerns related to marijuana and how it relates to their disease. As such, it is crucial for clinicians to understand frequency, modes, reasons, and effects experienced from usage of marijuana in this population. Our survey provides valuable building blocks of information on characteristics, experiences, and perceptions of patients with IBD who use marijuana.

Survey respondents commented on demographic information and co-morbidities. Most notable are the relatively high number of participants who reported having been diagnosed with a psychiatric disorder. Depression and anxiety were reported by 66 respondents (66.1%), ADD/ADHD by 21 (19.4%), and PTSD by 21 (19.4%). In contrast, the US-based study NESARC-III following 36,309 adult participants reported 12-month prevalence of major depression of 10.4% and lifetime prevalence of 20.6%[11]. Generalized anxiety disorder diagnosis in national cohorts is reported at 18.1%[12]. In patients with IBD, prevalence of anxiety has ranged from 19.1% - 35.1%, and depression from 21% - 25.2%[13]. Clues as to why our respondents reported higher incidence of depression and anxiety may be explained by a positive correlation between cannabis use and depression[14], as well as IBD and

depression[13]. Cannabis use has been reported to be a risk factor for development of depression and promote symptom progression[14]. This risk increases with heavier cannabis use[15]. On the other hand, patients with depression who are also dealing with debilitating symptoms of IBD may simply be using more marijuana for symptom control and coping. This highlights a vulnerable population who may require greater direction of resources for mental health treatment and screening.

A significant percentage (60%) of survey participants reported inhalation/smoking, and nearly 70% used marijuana daily. This suggests a population with relatively heavy use, which must be taken into context with responses regarding effects on quality of life and treatment. Previous studies have shown that patients with IBD compared to age/sex matched controls use a greater quantity and earlier onset of cannabis use, with 6.8 – 17.6% of these patients reporting usage[6]. Approximately 62% of participants reported that this was medical marijuana, and 49 participants (55.7%) stated that their decision to start marijuana was influenced by its legalization. Those who started smoking because of legalization tended to have smoked for <5 years (40 subjects). This further highlights the potential impact of new legislation on this patient population, as supported by other studies[16]. Among adults in the US, males are estimated to compromise 57.8-65.2% of cannabis users.[17] This is in contrast to our study which showed a male prevalence of 47.2% and female prevalence of 51.9%. This discrepancy is not explained entirely by co-existence of IBD, as this has also shown to have slight male predominance.[18] Our study findings may be attributed to statistical variation and local demographic variability.

A sizeable percentage (13.9%) of cannabis users in our study were aged 17-25. Previous studies have reported that initiation of cannabis use at a younger age can lead to higher daily doses of marijuana and to higher rates of dependence[6]. A larger quantity of use and longer duration of use in turn are risk factors for Cannabis Use Disorder, which is characterized by impaired control over use, social impairment from use, risky use, and/or pharmacologic tolerance or withdrawal[19]. Nonetheless, only 0.9% of survey participants reported worsening of relationships both at work and outside of work, 3.7% reported worsening ability to focus at work, and 0% reported worsening quality of life. This suggests that despite relatively heavy usage in the survey population, very few are likely to meet the social impairment criteria for cannabis use disorder. This contrasts with the prevalence of cannabis use disorder among daily users, which is estimated to range from approximately 36% to 44.6%[20,21]. However, this could reflect positive response bias since those who participated in the survey were current users, and likely not being impacted significantly by negative side effects.

The majority of survey respondents viewed marijuana use favorably in terms of its effect on IBD symptom management, quality of life, and independence. There are associations between the mode of marijuana use, the symptoms for which it is used, and the perception of symptom improvement. The survey respondents demonstrated appropriate insight regarding the complementary role of marijuana use in the management of their IBD. The majority of responses (67.6%) reflected understanding of the fact that although marijuana use can alleviate symptoms from IBD, there is a lack of evidence that it contributes to mucosal healing. This is in concordance with data from existing trials that have examined inflammatory markers and quality of life scores[8]. Survey respondents believed that marijuana use reduced their need for opioid use, and hence can be an alternative to opioid medication use in this patient population. Existing studies show mixed data regarding direct efficacy of cannabis in treating pain. Delta-9 THC was not superior to placebo in treating chronic abdominal pain,[22] while more selective CB2 agonists such as Olorinab showed mixed results in treating visceral abdominal pain in both IBS[23] and IBD[24]. Survey respondents reported that marijuana use either improved or did not affect various aspects of daily functioning, such as quality of life, ability to live independently, ability to focus at work/school, and relationships outside of work/school (Table 2).

The physiologic explanation for improvement in quality of life in patients with IBD following cannabinoid use may be related to CB1 and CB2 effects in the gut. Cannabis's main active ingredient is Delta-9 THC which activates both CB1 and CB2 receptors[25,26]. Animal studies have shown that interplay between exogenous cannabinoids and post-synaptic CB1 and CB2 receptors in the enteric nervous system play a complex role in modulating intestinal ion transport, permeability, inflammation, and peristalsis[25,27]. These can play both deleterious and beneficial roles in IBD. While the majority of data on cannabis in the gastrointestinal tract is from animal models, there are suggestions that it may play a role in improving sensitivity to colonic distention,[28] improving nausea, and improving small intestinal barrier function. On the other hand, both human and animal studies suggest cannabinoids can delay gastric emptying[29] and post-prandial colonic motility,[30] increase risk for acute pancreatitis,[31] and increase hepatic fibrogenesis[25,32].

The frequency of marijuana use was associated with use for various IBD symptoms, and the logistic regression found that survey respondents with a history of bowel surgery had an increased marijuana use frequency (once or

more monthly, but not daily) and duration (greater than 5 years). This finding is consistent with other survey studies, which have reported that cannabis may be a predictor for needing surgical intervention in IBD. On the other hand, a relatively large proportion of subjects surveyed had reported history of bowel surgery (42.6%), internal fistula (37%), and abscesses (32.4%) which speaks to the disease severity among participants who use marijuana. This further emphasizes the need for more extensive trials that examine effects of marijuana use in this population. The severity of the participants' disease and the duration since diagnosis may contribute to this association between bowel surgery and increased frequency and duration of marijuana use.

Most survey respondents (89.5%) demonstrated significant comfort in disclosing their marijuana use to their providers. This may reflect a positive trend in de-stigmatization by the medical field regarding marijuana, which allows patients to be more transparent about their health practices. Importantly, this opens the door for clinicians to be able to listen to patients' needs and concerns regarding marijuana use and to be able to counsel them about available evidence and effects. On the other hand, only a small number of participants (24.5%) noted counseling on drug-drug interactions between marijuana and prescription medications. This is an important facet of care, as THC metabolism can be affected by drugs which impact the cytochrome P450 system and vise-versa[33]. In addition, THC can increase serum concentration of warfarin[34] and decrease concentrations of hormonal contraceptives[35]. A low frequency of drug-counseling may be in part due to a lack of a standardized, evidence-based approach available to providers for patient counseling. Furthermore, clinicians themselves often lack sufficient knowledge about medical cannabis, a problem that likely stems both from lack of implementation in medical school curricula[36] as well as a lack of high-quality research on marijuana and drug interactions[37].

Limitations of this study include a small sample size (n = 108) from a single center, and the potential for positive response bias because all participants were current marijuana users indicating absence of significant side effects. In addition, the overall burden of psychiatric comorbidity, disease severity, and relatively heavy use of marijuana may limit generalizability of survey results. Further studies would benefit by incorporating a control cohort of patients with IBD who do not use marijuana for comparison.

With legalization of marijuana continuing to expand across the United States, more and more patients with IBD will be turning towards it as a means of improving their QOL. These patients remain a vulnerable population due to the physical, social, and economic challenges related to living with a complex and debilitating chronic disease. Currently there is a dearth of patient reported outcomes regarding safety and efficacy of this substance and a lack of standardized, evidence-based tools for clinical counseling. This further puts patients at risk of seeking information through less reliable sources, such as social media. Our data sheds light on the patient reported outcomes of marijuana use in this population as they struggle with their unique social, quality of life and disease related challenges, and better equips healthcare providers in offering appropriate counselling to IBD patients considering marijuana use. Our study is a steppingstone in bridging the knowledge gap in the health outcomes of patients with IBD using marijuana and adding to an evidence-based patient education approach for physicians caring for this population.

Conclusion

Marijuana can be helpful for symptom control, reducing the reliance on opioid analgesics, and may improve quality of life in patients with IBD. Participants demonstrated good insight regarding the role of marijuana in the management of their disease

Statements

Statement of Ethics

This study was performed in accordance with the Declaration of Helsinki. This human study was approved by University of Florida IRB - approval: IRB202001429, 6/3/2024. All adult participants provided written informed consent to participate in this study

Author Contributions

Arvin Daneshmand contributed to manuscript writing, data interpretation, and manuscript writing
Karen Yung contributed to project development, data collection and manuscript writing
Hanzhi Gao contributed to data interpretation and analysis
Chelsea Salmon contributed to data collection and manuscript preparation
Saroja Devi Rampertab contributed to project development and manuscript editing
Angela Pham contributed to project development, data collection and manuscript editing
Nofel Iftikhar contributed to figure preparation and manuscript preparation
Ludmila Faria contributed to project development, data collection, data interpretation and manuscript writing
Ellen Zimmerman contributed to project development, data interpretation and manuscript editing

Naueen Chaudhry contributed to study design, survey preparation, background research, administration, data collection, data analysis, manuscript writing and editing

Conflict of Interest Statement

The authors have no conflicts of interest to declare

Data Availability Statement

The data that support the findings of this study are not publicly available due to privacy reasons but are available from the corresponding author upon request

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Figure Legends

Figure 1: Patient Perceptions of Marijuana Use

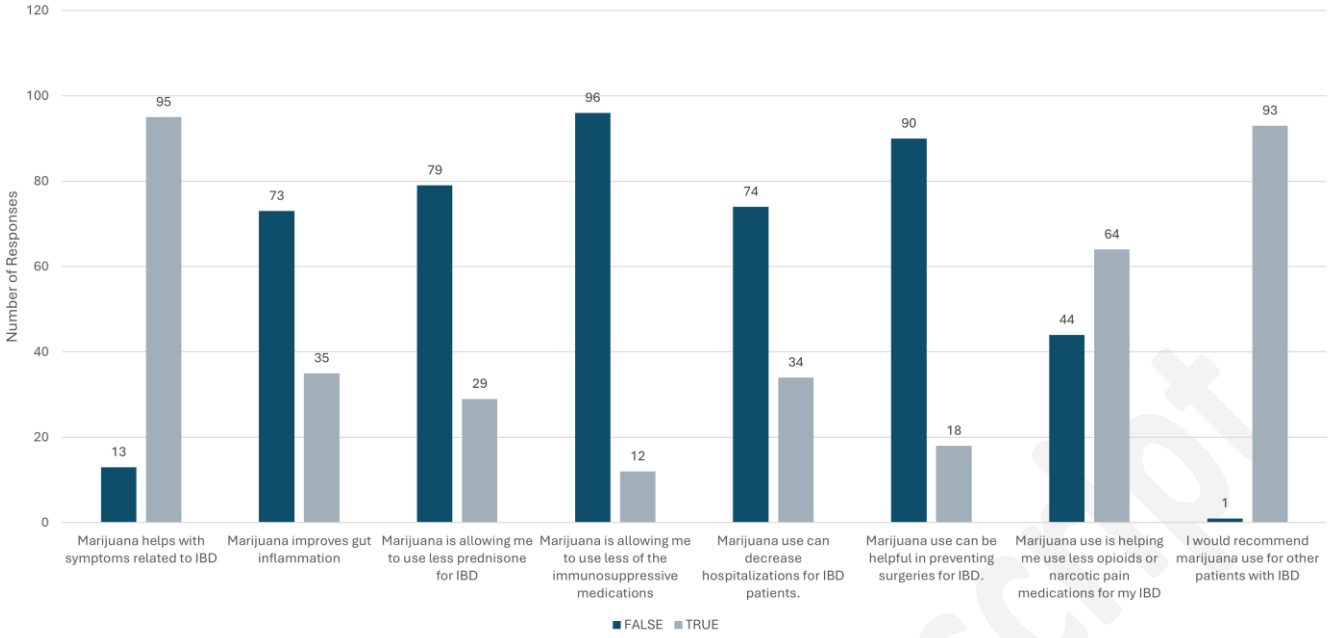
Figure 1 shows patient perceptions on marijuana use when presented with various statements in "true" and "false" fashion. Participants demonstrated good insight into marijuana's impact on their disease pathophysiology. They reported generally positive analgesic effects from use.

Figure 2A (Top Left): Hesitancy to Marijuana Use

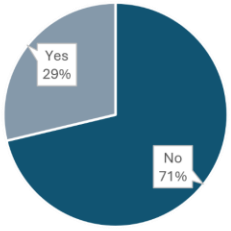
Figure 2B (Right): Reasons for Hesitancy

Figure 2C (Bottom Left) Legalization Perceptions

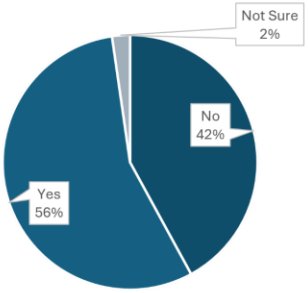
Figures 2a, 2b, 2c showing responses regarding hesitancy to start using marijuana. Most participants did not report hesitancy for starting marijuana, but those that did more commonly reported cognitive health and legal reasons



Were you previously hesitant to starting medical marijuana based on your concerns?



Was Your Decision To Start Marijuana Influenced By Its Legalization?



If You Were Hesitant To Start Marijuana, What Were Your Concerns?

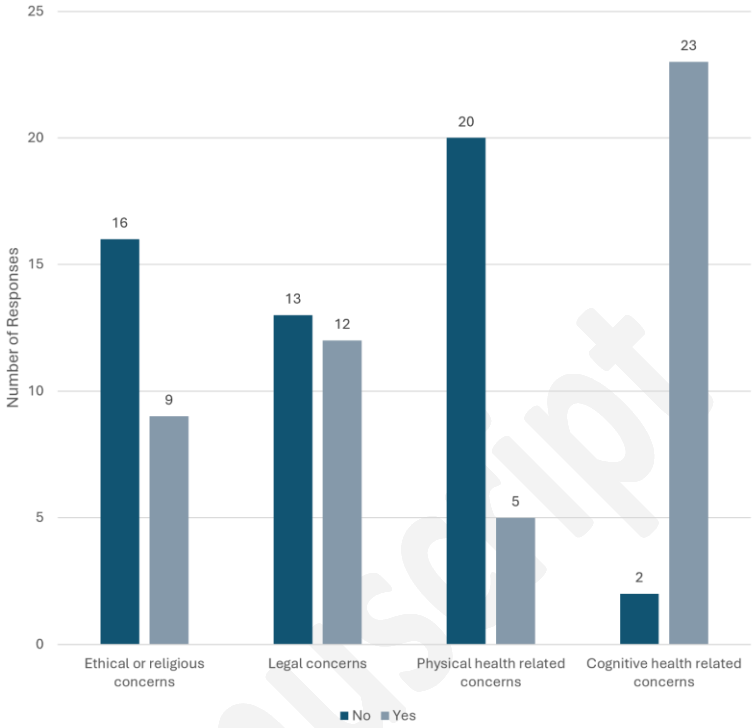


Table 1a: Patient Demographics	
Characteristics	**Number of Patients**
Age	
17-25 years	15 (13.9%)
26-45 years	54 (50.0%)
46-65 years	29 (26.9%)
>65 years	10 (9.3%)
Gender	
Male	51 (47.2%)
Female	56 (51.9%)
Non-Binary	0 (0%)
Prefer not to answer	1 (0.9%)
Working Status	
College student	18 (16.7%)
Employed	41 (38.0%)
Not working or studying	36 (33.3%)
Retired	13 (12.0%)
Mental Health Comorbidities	
Depression/Anxiety	
No	42 (38.9%)
Yes	66 (61.1%)
ADD/ADHD	
No	87 (80.6%)
Yes	21 (19.4%)
Eating disorder	
No	103 (95.4%)
Yes	5 (4.6%)
Bipolar disorder	
No	101 (93.5%)
Yes	7 (6.5%)
PTSD	
No	87 (80.6%)
Yes	21 (19.4%)
Other mental diagnosis	
No	103 (95.4%)
Yes	5 (4.6%)

Table 1b: Marijuana Use Patterns	
Characteristics	**Number of Patients**
Type of Marijuana Use	
Recreational	15 (13.9%)
Medical	65 (60.2%)
Combination	25 (23.1%)
Missing	3 (2.8%)
Duration of Marijuana Use	
<1 month	2 (1.9%)
1 to 6 months	3 (2.8%)
3 to 12 months	9 (8.3%)
12 months to 5 years	45 (41.7%)
> 5 years	45 (41.7%)
Missing	4 (3.7%)
Frequency of Marijuana Use	
Daily/almost daily	71 (65.7%)
One or more times/week	17 (15.7%)
One or more times/month	5 (4.6%)
Less than once a month	11 (10.2%)
Missing	4 (3.7%)
Modality of Marijuana Use	
Oral non-edible	12 (13.8%)
Topical	2 (2.3%)
Rectal	0 (0%)
Edibles	21 (24.1%)
Inhalation/smoking	52 (59.8%)

Table 1c: IBD History	
Characteristics	**Number of Patients**
Current Treatment for IBD	
None	
No	89 (82.4%)
Yes	19 (17.6%)
Steroids	
No	98 (90.7%)
Yes	10 (9.3%)
5-ASA	
No	93 (86.1%)
Yes	15 (13.9%)
Azathioprine/6-MP	
No	85 (78.7%)
Yes	23 (21.3%)
Methotrexate	
No	101 (93.5%)
Yes	7 (6.5%)
Biologics and Small Molecules[1]	
No	47 (43.5%)
Yes	61 (56.5%)
IBD-related Complications	
Hospitalization	
No	25 (23.1%)
Yes	83 (76.9%)
Bowel Surgery	
No	62 (57.4%)
Yes	46 (42.6%)
Fistula (excluding peri-anal fistulae)	
No	68 (63.0%)
Yes	40 (37.0%)
Abscess	
No	73 (67.6%)
Yes	35 (32.4%)
Bowel cancer	
No	108 (100.0%)
Yes	0 (0%)
None of the Above	
No	108 (100.0%)
Yes	0 (0%)

1. Includes TNF inhibitors, JAK inhibitors, IL inhibitors, integrin receptor antagonists, S1P receptor modulators.

Table 1 – Characteristics of survey respondents. Median age was 26-45 years. Rates of employment reported at 38%, with 16.7% college stu 12% retired. Majority of respondents reported duration of Marijuana use >12 months. Medical marijuana was the most common type of mariju High rates of mental health co-morbidities are seen. Over 76% of respondents had a history of hospitalization for IBD, and 42.6% had a histor surgery.

Table 2					
Table 2a: Symptoms Treated		**Table 2b: Social Impacts**		**Table 2c: Adverse Impacts**	
Responses	**Number of Patients**	**Responses**	**Number of Patients**	**Responses**	**Number of Patients**
Total (N)	108				
Symptoms Treated with Marijuana		**Overall Effect on Symptoms**		**Monthly Cost of Medical Marijuana**	
Diarrhea		Complete Resolution	5 (4.8%)	< $100	38 (43.7%)
No	77 (71.3%)	Significant Improvement	59 (56.2%)	$101 to $300	25 (28.7%)
Yes	31 (28.7%)	Mild Improvement	36 (34.3%)	>$300	6 (6.9%)
Nausea/vomiting		Unchanged	5 (4.8%)	Don't know	18 (20.7%)
No	50 (46.3%)	Worsened	0 (0%)	Missing	21 (19.4%)
Yes	58 (53.7%)	Missing	3 (2.8%)	**Presence of Adverse Side Effects**	
Bloody stool		**Effect on Quality of Life**		No	80 (90.9%)
No	103 (95.4%)	Improved	92 (87.6%)	Yes	8 (9.1%)
Yes	5 (4.6%)	Worsened	0 (0%)	Missing	20 (18.5%)
Fatigue		Unchanged	13 (12.4%)	**Need for Hospitalization due to Marijuana Side Effects**	
No	76 (70.4%)	Missing	3 (2.8%)	No	83 (94.3%)
Yes	32 (29.6%)	**Effect on Ability to Live Independently**		Yes	2 (2.3%)
Fever/chills		Improved	65 (61.3%)	Not sure	3 (3.4%)
No	103 (95.4%)	Worsened	1 (0.9%)	Missing	20 (18.5%)
Yes	5 (4.6%)	Unchanged	40 (37.7%)		
Joint pain (arthritis, arthralgia)		Missing	2 (1.9%)		
No	49 (45.4%)	**Effect on Ability to Focus/Concentrate at Work or School**			
Yes	59 (54.6%)	Improved	28 (26.2%)		
Insomnia		Worsened	4 (3.7%)		
No	57 (52.8%)	Unchanged	43 (40.2%)		
Yes	51 (47.2%)	Not applicable	32 (29.9%)		
Anxiety		Missing	1 (0.9%)		
No	43 (39.8%)	**Effect on Relationships at Work**			
Yes	65 (60.2%)	Improved	14 (13.1%)		
Poor appetite		Worsened	1 (0.9%)		
No	61 (56.5%)	Unchanged	39 (36.4%)		
Yes	47 (43.5%)	Not applicable	53 (49.5%)		
Weight loss		Missing	1 (0.9%)		
No	93 (86.1%)	**Effect on Relationships Outside of Work**			
Yes	15 (13.9%)	Improved	38 (35.5%)		
Other		Worsened	1 (0.9%)		
No	90 (83.3%)	Unchanged	50 (46.7%)		
Yes	18 (16.7%)	Not applicable	18 (16.8%)		
		Missing	1 (0.9%)		

Table 2 – Respondents' reasons for and impact of marijuana use. Anxiety (60.2), joint pains (54.6%) and nausea/vomiting (53.7%) were common symptoms treated. Improvements in quality of life (87.6%) and independent living (61.3%) were reported. Adverse effects reported by 9.1% of participants, 2.3% requiring hospitalization for these.

Table 3: Proportional Odds Logistic Regression

Variable	Level	OR	95% CI		P-value
Were you Hospitalized for Inflammatory Bowel Disease?					
For how long have you been using Marijuana? (Ref: <12 months)	12 months - 5 years	1.84	0.19	18.38	0.840
	> 5 years	1.30	0.12	12.94	
How often are you currently using Marijuana? (Ref: Daily/nearly daily)	≥ 1 times/week	0.47	0.06	3.53	0.669
	≥1 times/month	0.90	0.04	18.17	
	<1 time/month	2.99	0.19	101.68	
Did you Require Bowel Surgery for IBD?					
For how long have you been using Marijuana? (Ref: <12 months)	12 months - 5 years	3.50	0.46	33.80	0.002
	> 5 years	21.94	2.91	250.18	
How often are you currently using Marijuana? (Ref: Daily/nearly daily)	≥ 1 times/week	11.13	1.78	97.69	0.041
	≥1 times/month	0.71	0.03	9.17	
	<1 time/month	6.47	0.45	136.21	
How did Marijuana use affect your symptoms overall? (Better outcome)					
Age (Ref: 17-25 years)	26-45 years	0.94	0.19	4.59	0.807
	46-65 years	1.20	0.18	7.87	
	>65 years	0.48	0.05	4.82	
Gender (Ref: Male)	Female	2.63	1.00	7.18	0.057
Diagnosis (Ref: Ulcerative colitis (UC) and Indeterminate Inflammatory Bowel Disease (IBD))	Crohn's disease (CD)	1.79	0.56	5.86	0.334
When were you diagnosed with IBD? (Ref: Less than 5 years ago)	5-10 years ago	0.33	0.07	1.59	0.125
	> 10 years ago	0.22	0.05	0.94	
Method of Marijuana use (Ref: Recreational)	Medical	1.92	0.37	10.13	0.009
	Combination	9.58	1.56	66.25	
How long have you been using Marijuana? (Ref: <12 months)	12 months - 5 years	2.18	0.49	9.91	0.5545
	> 5 years	1.55	0.34	6.99	
How often are you using Marijuana? (Ref: Daily/near daily)	≥ 1 times/week	0.37	0.11	1.30	0.036
	≥1 times/month	0.08	0.01	0.59	
	<1 time/month	0.25	0.04	1.73	

Table 3 – Proportional odds logistical regression. Participants with a history of bowel surgery had significantly higher odds of using marijuana for more than 5 years (OR 21.94, CI [2.91, 250.18], p=0.0059) and of using marijuana once or more times monthly (OR 11.13, CI [1.78, 97.69], p=0.0163). Marijuana users with a history of hospitalization for IBD had higher odds of having depression/anxiety (OR 14.4, CI [2.34,143.2] p=0.009) and diarrhea symptoms (OR 13.3, CI [2.2,129.0] p=0.01). Additionally, combination marijuana use (OR 9.58, CI [1.56, 66.25] p=0.0199) was associated with greater odds of self-reported symptom improvement.