

The Potential Effectiveness of Medical Cannabis in the Treatment of Wellness Outcomes for Veterans with Depression

Mandy Liedeman, Chanile Vines, Justin Whitehall

Research Department, Avail Medical Clinic, Toronto, Canada
Email: justin@availcannabis.com

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Abstract

Depression is a pervasive mental illness with a prevalence of about nine percent of the Canadian population (Van Ameringen et al., 2008). Depression commonly presents with several chronic symptoms that can severely impact the quality of life and mental well-being, such as intrusive thoughts, flashbacks, irritability, anxiety, and sleep disturbances (Sharpless & Barber, 2011). Military veterans are notably present with much higher rates of depression than civilians (Veterans Affairs Canada, 2019). There is no single effective treatment, and persons with depression might receive multiple modes of treatment in combination. To date, few studies have characterized the demographic characteristics of medical marijuana patients or assessed them for pre-post changes in well-being. A mixed methods study was conducted to better understand therapeutic benefits for patients. Here, we aimed to describe physician authorization patterns of medical cannabis products and observe the self-reported effectiveness and wellness outcomes (depression and anxiety) of medical cannabis among Veterans from Avail Cannabis Clinic. **Methods:** A total of 34 patients were recruited for retrospective chart review. Researchers compared outcomes using the Patient-Health Questionnaire (PHQ-9) for the depression wellness scale. On intake and assessment, doctors interviewed patients on their lived experiences, and the questions were similar to the survey questions, with more opportunities for open-ended responses. Patients were asked to describe preconditions and treatment goals. **Results:** The average score before the administration of the treatment was 14.6, which according to the scoring guide, denotes moderate to moderately severe depression symptoms. After the treatment was administered, the average PHQ-9 total score decreased to 10.5, which according to the scoring guide highlights mild to moderate depression symptoms. A linear regression was also conducted to determine whether the dosage is a good predictor of the

change in depression. The r^2 value shows that the model explains roughly 23% ($r^2=0.236$) of the data. When asked to provide a percentage to characterize the change in symptoms, an average decline of 42% was verbally indicated by participants when asked to report the percentage of decreased pain. A similar self-reported improvement was seen with increased activity, where 38% of participants increased their activity. **Conclusion:** The interview and survey results indicate that patients seek medical cannabis to relieve medical ailments and have reported better-improved quality of life, mobility, and decreased pain. This finding aligned with previous studies which also found increased overall condition and energy as the most significant perceived benefits. The results may provide further clinical evidence to support the use of medical cannabis for depression symptoms and support more extensive research studies in the future.

Keywords

Depression, PTSD, Medical Cannabis, Veteran, Cannabinoid Therapy

1. Introduction

Military veterans represent about five percent of the Canadian adult population. Prior research in Canada, the United States, and elsewhere demonstrates that, on average, veterans have a lower quality of life in both mental and physical health domains relative to the general population (Singh et al., 2005; Thompson et al., 2016). Veterans have a poorer quality of life due to a litany of reasons that may include physical handicaps/limitations, chronic pain, substance use issues, stress/anxiety, or other mental health conditions (e.g. post-traumatic stress disorder, PTSD) (El-Gabalawy et al., 2015; Hopman et al., 2015; Schnurr et al., 2009; Singh et al., 2005). Lower quality of life among veterans results in greater use of inpatient and outpatient care and is associated with increased chances of mortality (Singh et al., 2005). Thus, improving the quality of life among veterans is of considerable public health importance.

Medical cannabis was made publicly available in Canada in 2001, with the Canadian Institute of Health Research (CIHR) citing possible benefits such as effectiveness in chronic pain treatment (Van Ameringen et al., 2008). In July 2018, cannabis was legalized for recreational purposes in Canada under Health Canada's Cannabis Act. Coincident with changing policies surrounding cannabis legalization, there is growing recognition of the potential therapeutic benefits of cannabis. For example, Veterans Affairs Canada (VAC) has implemented reimbursement policies for medical cannabis, and the number of patients reimbursed for medical cannabis has increased exponentially over the past several years; from 2017-2018, a total of 7298 patients were reimbursed for medical cannabis, and this number increased to over 17,000 patients in 2021-2022 (Veterans Affairs Canada, 2021). However, at present, detailed data on use patterns of cannabis among veterans is lacking (e.g. quantity/timing of use, types of products used),

and there is limited longitudinal data on how cannabis impacts the quality of life among these individuals. CIHR states there remain many unknowns about the use of cannabis and its health and safety effects (Sharpless & Barber, 2011). Cannabis is available in inhaled, oral, and sublingual formats (MacCallum & Russo, 2018). It is commonly used for chemotherapy-induced nausea and vomiting, spasticity, chronic pain (Allan et al., 2018), depression, and various mental health symptoms (Walsh et al., 2017). The cost of medical cannabis for Canadian veterans has been reimbursed by Veterans Affairs Canada since 2008, with the number of clients accessing this reimbursement program jumping from 37 persons in 2008 to 14,640 within the past ten years (Veterans Affairs Canada, 2019). This sharp increase suggests there is a need for medical cannabis among veterans with health conditions, and this might be related to the efficacy of medical cannabis for health outcomes. The current literature base, however, is limited, and smaller studies can contribute to the development of more extensive studies in this field.

Depression is a pervasive mental illness with a prevalence of about nine percent of Canadians (Van Ameringen et al., 2008). Depression commonly presents with several chronic symptoms that can severely impact the quality of life and mental well-being, such as intrusive thoughts, flashbacks, irritability, anxiety, and sleep disturbances (Sharpless & Barber, 2011). Military veterans are notably present with much higher rates of depression than civilians due to exposure to war-related traumatic experiences (Veterans Affairs Canada, 2019). There is no single effective treatment, and persons with depression might receive multiple modes of treatment in combination (Van Ameringen et al., 2008). Current approaches include pharmaceutical intervention and psychological or therapeutic (e.g. cognitive behavioural therapy, psychotherapy, or mindfulness-based stress reduction) methods (Petersen et al., 2021). One standard treatment approach is the prescription of medical cannabis for relieving depression symptoms (Orsolini et al., 2019).

To date, few studies have characterized the demographic characteristics of medical marijuana patients or assessed them for pre-post changes in well-being. A mixed methods study was conducted to better understand therapeutic benefits for patients. Given the wide range of product formulations and potential therapeutic applications, Real-World Evidence (RWE) studies are critical to gain insight into the authorization patterns, safety, and associated effects of medical cannabis products. However, Randomized Controlled Trials (RCTs) are the gold standard in demonstrating treatment efficacy. RWE studies may extend highly controlled RCTs via higher levels of external validity and generalizability (Hindocha et al., 2020). RWE is, therefore, an important complement to the study of medical cannabis. While several observational studies of medical cannabis support its safety and effectiveness in specific therapeutic areas, few have examined the safety and effectiveness of medical cannabis in the veteran population or as a function of its cannabinoid content (Booth & Tannock 2014; Bouso et al., 2020; Casarett et al., 2019; Lim et al., 2017; Takakuwa et al., 2020). Here, we aimed to

describe physician authorization patterns of medical cannabis products and observe the self-reported effectiveness and wellness outcomes (depression and anxiety) of medical cannabis among Veterans from Avail Cannabis Clinic. This study contributes to the literature on patient perspectives on the benefits of cannabis for medical conditions and on implementing the medical marijuana program amongst Veterans in Ontario, Canada.

2. Objective

The purpose of this study is to 1) describe the factors that motivate veterans to seek medical cannabis and 2) evaluate the perceived therapeutic benefits of medical cannabis. To address the first objective, the researchers sought to identify multiple medical reasons patients choose to use medical cannabis to manage their health conditions. To address the second objective, the researchers examined patient feedback, pre, and post-scores using surveys and the Patient-Health Questionnaire (PHQ-9) for Depression outcomes.

3. Participants

The research team investigated Canadian veterans aged 25+, with a diagnosis of Post-Traumatic Stress Disorder (PTSD) who have been provided with medical authorization for cannabis by a licensed healthcare practitioner, are registered as a client with a licensed producer, and use medical cannabis (in any format) to treat symptoms for at least six months. Any patient with cardiovascular disease (angina, peripheral vascular disease, cerebrovascular disease, arrhythmias), respiratory or oral disease, or any other serious systemic disorders; pregnancy/planning to become pregnant or breastfeeding; history of schizophrenia, psychosis, bipolar disease, borderline personality disorder, dissociative personality disorder, delirium or dementia; and previous enrollment in a cannabis-related study were excluded. Data was collected and performed in accordance with the Declaration of Helsinki. Ethical approval was granted by the Centre of IRB Intelligence for Protocol 00048415.

4. Methods

4.1. Retrospective Electronic Medical Record (EMR) Chart Review

Thirty-four Canadian military veterans using medical cannabis and patients from Avail Cannabis Clinic were recruited for retrospective chart review. Researchers reviewed participants' data from at least six months to compare changes in depression and general well-being. EMR consists of participants' demographic data, medication history, medical cannabis authorization/consumption amounts, physician notes, and other pertinent data for analysis. Participants provided scores on medical outcomes such as pain, activity level, and overall well-being. Patients were asked to score these symptoms on a scale of 1 - 10 at the start of treatment and six months post-treatment to indicate how these symptoms (listed above)

impact their lives. Scores and impact pre and post were analyzed.

4.2. Doctors' Interviews

On intake and assessment, doctors interviewed patients on their lived experiences, and the questions were similar to the survey questions, with more opportunities for open-ended responses. Patients were asked to describe preconditions and treatment goals. After six months, patients were asked questions based on these goals to assess for impact. Researchers conducted a qualitative assessment to further understand patient experience and the potential effectiveness of cannabis. Interviews can be particularly valuable for capturing expressive information about beliefs, values, feelings, motivations, and experiences that underscore behaviours (Berkwits & Inui, 1998). Feedback on preferences for different forms and strains of medical cannabis (e.g. edibles, oils, etc.) and any perceived or actual drug interaction effects or unpleasant side effects were gathered. All 34 interviews were transcribed, and MAXQDA Version 2018 (Marburg, Germany) was used to code the qualitative data using content codes based on each question and creating subcodes for question areas such as symptoms or health conditions. For example, there were parent codes based on health conditions, use of prescription medications, and patterns of use. Coders read all the transcripts and agreed on the codebook and code definitions. For each code category, exemplary quotes were selected to illustrate key points in the findings.

4.3. Surveys

Researchers compared outcomes using the Patient-Health Questionnaire (PHQ-9) for the depression wellness scale (Spitzer, 1999). The PHQ-9 is a nine-item depression scale of the patient's health. The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV. The PHQ-9 can function as a screening tool, an aid in the diagnosis, and act as a symptom-tracking tool that can help track a patient's overall depression severity and the improvement of specific symptoms with treatment. The questionnaire relies on patient self-report. The clinician verified all responses, and a definitive diagnosis was made on clinical grounds considering how well the patient understood the questionnaire. All 34 patients completed the post-analysis of the PHQ-9 survey, but only half had a pre-assessment online, limiting our pre-post analysis to only patients with both.

Figure 1 presents the Patient Health Questionnaire (PHQ-9) developed by Dr. Robert L Spitzer.

5. Results

5.1. Demographics

A total of 34 participant charts were reviewed. The survey respondents ranged from 19 to 77 years old, with an average age of 54. There were more male participants (69%) than female respondents (31%).

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

ID #: _____ DATE: _____

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns + +

(Healthcare professional: For interpretation of TOTAL, TOTAL:
please refer to accompanying scoring card).

10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	_____
	Somewhat difficult	_____
	Very difficult	_____
	Extremely difficult	_____

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Figure 1. Patient Health Questionnaire-9 (PHQ-9). PHQ-9 scores and depression severity
PHQ-9 Score: 0 - 4: none-minimal; 5 - 9: mild; 10 - 14: moderate; 15 - 19: moderately severe; 20 - 27: severe.

5.2. Usage Patterns

There was variability in the daily usage of medical cannabis. Usage patterns varied to include: once a day 27%, 2 - 3 times a day 21%, and 4 times a day 52%. In terms of administration, dried was the most common, also called inhalation. Other forms included capsules and oil.

Figure 2 presents a plot of the difference pre and post and the amount of X provided at treatment in grams. A positive difference (the post-total score is higher than the pre-total score) was observed in several participants. The graph shows some slight upward movement, such that participants who saw marked improvements were prescribed a higher dose at the treatment stage.

5.3. PHQ-9 Results

Respondents reported that medical cannabis improved from moderately severe to mild/moderate for their medical condition based on the PHQ-9 nine-item depression scale.

As presented in **Table 1**, the average amount of doses provided was 4.9 grams per day, with a standard deviation of about 2.6 grams per day. The total scores from the PHQ-9 were calculated by adding participants' responses. The minimum PHQ-9 total score reported by participants before (pre) administration of the treatment was 5, and the maximum reported total score was 25. The average score before the administration of the treatment was 14.6, which according to the scoring guide, denotes moderate to moderately severe depression. After the treatment was administered, the average PHQ-9 total score decreased to 10.5, which according to the scoring guide, highlights mild to moderate depression symptoms.

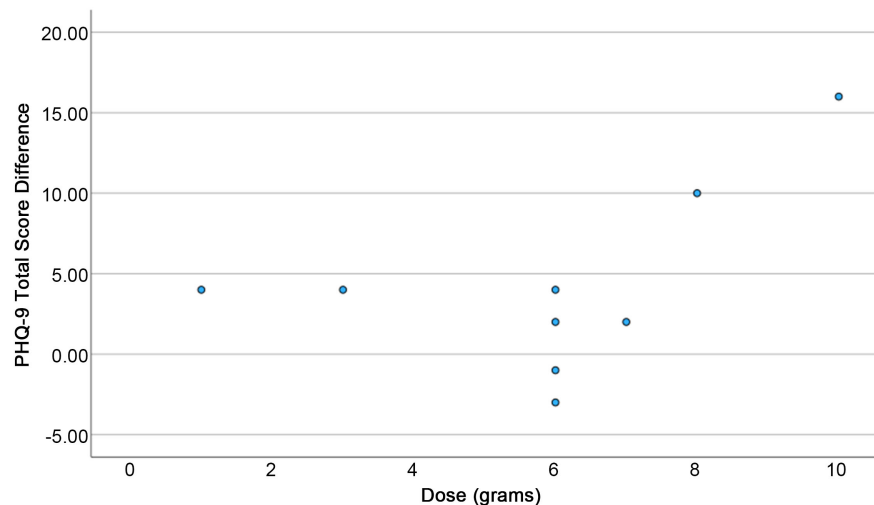


Figure 2. Differences in PHQ-9 total scores and dosage amount in grams (n = 9).

Table 1. Frequency table.

	Dosing (grams)	PHQ-9 total scores	
		Pre (n = 13)	Post (n = 30)
Mean (sd)	4.9 (2.6)	14.31 (6.62)	10.50 (6.87)
Min	1	5	0
Max	10	25	24

Note: sd: standard deviation.

A linear regression was also conducted to determine whether the dosage is a good predictor of the change in depression. The first model included dosage and total PHQ-9 scores. The model summary table provides the Pearson coefficient (listed above) ($r = 0.4$). The r^2 value shows that the model explains roughly 23% ($r^2 = 0.236$) of the data.

5.4. Survey and Interview Results

Participants were asked to respond to questions regarding the benefits of medical cannabis based on a 10-point scale. The results indicated participants reported their overall condition improved, with the greatest improvements for increased activity and decreased pain. As a follow-up, respondents explained that medical marijuana improved their condition related to pain reduction. For example, to help with anxiety, one participant responded, “Reduce anxiety, improve daily function, improve appetite, improve mood, and sleep”. The pain was also frequently discussed. One participant explained, “Pain was regularly in the 8 - 9 score. Now, most days, I’m around a 4 - 5 following use. I can do more”.

Respondents checked off several medical conditions for potential effective treatment with medical cannabis. The most common of these included depression, muscle spasms, headache, mobility, concentration, sleep disturbance, lack of appetite, and low energy. These eight conditions accounted for more than 85% of the total conditions listed. When asked for a follow-up about additional medical conditions that could benefit from medical cannabis, anxiety and insomnia were listed. Respondents reported an average score of 6 on a scale of 1 (no adverse symptoms) to 10 (adverse symptoms) before using medical cannabis. After six months of treatment, participants reported a score of 4 post-follow-up. When asked to provide a percentage to characterize the change in symptoms, an average decline of 42% was verbally indicated by participants when asked to report the percentage of decreased pain. A similar self-reported improvement was seen with increased activity, where 38% of participants increased activity.

6. Discussion

From this retrospective chart review, three major findings emerged. First, the medical use of cannabis was associated with improvements in several psychological and physical symptoms. Over the six-month period, respondents reported better outcomes post-cannabis use for depression, muscle spasms, headaches, mobility, concentration, sleep disturbance, lack of appetite, and low energy. Second, there was variability in physician authorization of the usage of medical cannabis. Third, oil and dried formats were the predominant format of authorized medical cannabis. There was a variety in time of day with a more substantial authorization for evening use. While there was a consistency in the number of authorized products taken by a patient, meaning no increase or decrease, over time, there were changes in the type of product. At the start, most patients were authorized a balance (THC:CBD), but at the six-month follow-up,

most patients had transitioned to THC-dominant products. This preference for THC—dominant products over time is seen in other studies (Kalaba & Ware, 2022). These changes in patients' time and type preferences indicate the need for more studies to show the usage pattern over time. While a flexible, personalized approach is preferred for care, these studies can help create clinical guidelines to fill the gap in knowledge on desired dosing levels and treatment time.

This study has highlighted the need for further research to examine the reasons for changes in dosing and patterns of consumption. The complexity of cannabis administration, including form, type, and supplier, makes it difficult, but a necessary data component that needs to be captured across patient groups. This can give insight into dosing, safety, and effectiveness. While this research included multiple outcome measures, physicians and self-report future studies can include more self-reported assessments like the Positive Mental Health Scale (PMH Scale), Brief Irritability Test (BITe), and Pittsburgh Sleep Quality Index (PSQI) that can further standardize the primary reported outcomes post cannabis use. This study did not assess demographics concerning the continuation of the prescribed cannabinoid. Studies have shown differences in discontinuation rates based on age, socioeconomic status, and diagnosis (Kaufmann et al., 2022). The cost has also been highlighted as a factor, although it is less prohibitive in Canada because cannabis therapy is covered by many largely accessible insurance providers (Carrieri et al., 2020). Adherence has also been tied to unique factors such as previous use, to treatment in other health issues and patient-physician relations (Horne, 2020), which have all shown better outcomes and effectiveness. Various factors can impact patient outcomes; knowing these factors and how they may impact patients is essential to advancing cannabinoid therapy and care. This study contributes to the literature that shows the benefits of cannabis therapy as it relates to specific physiological and physical outcomes.

7. Conclusion

The interview and survey results indicate that patients are seeking medical cannabis to relieve medical ailments and have reported improved quality of life, mobility, and decreased pain. This finding aligned with the survey study by Crowell (2017), which also found increased overall condition and energy as the most significant perceived benefits. Other studies had reported patients having symptoms return when they decreased or stopped cannabis use (Ware et al., 2005). Given the complex evidence, more research needs to be done to understand the pharmacology of cannabis and dosing options. Doing so will enable doctors to better monitor for positive health outcomes and toxicity associated with its use and make informed recommendations.

To meet the first objective, the research team identified veteran patients referred for medical cannabis use by healthcare providers. Patients were seeking therapeutic benefits, most noted being pain reduction and overall mood management. This study provided valuable information on patients' explanations of patterns of

use, the cause that motivated seeking cannabis, and self-reported impact on medical conditions. The results of this study provide preliminary findings that can be used to further examine the impact of medical cannabis on depression, PTSD, and general well-being. Since most other medications are prescribed for specific ailments, in contrast, cannabis is used to solve multiple concurring medical conditions. Areas for future study can focus on specific medical needs, e.g. sleep. One limitation of this study was that medical cannabis, in replacement of other depression treatments, was not evaluated. While participants were not required to stop other forms of therapy for depression, other therapies being utilized were recorded. Therefore, improvement of their symptoms may be a combination of both cannabis and other therapies.

Future studies can focus on specific medications, such as comparing pain management effectiveness between patients using prescription and medical cannabis only.

This study identified some areas of potential benefit in terms of symptom relief that might vary due to dosage and frequency of use. From a research participation perspective, a positive study outcome was identifying the willingness of respondents to complete the survey. Medical marijuana patients were very willing to participate in both the surveys and interviews and took an active interest in wanting to learn about the outcomes of this research study. This finding bodes well for future research on understanding patient perspectives on using cannabis-based medicines. The findings may provide further clinical evidence to support the use of medical cannabis for depression symptoms and support more significant research studies in the future.

Conflicts of Interest

The authors declare that no conflicts of interest or disputes are associated with this research. They have no financial or personal relationships with individuals or organizations that could inappropriately influence or bias the outcomes of this study. Furthermore, no financial or non-financial interests might be perceived as influencing the objectivity of the research conducted or the results presented in this paper.

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