

The effect of medical cannabis on alcohol and tobacco use in veterans with post-traumatic stress disorder (PTSD)

Shicheng Jin¹, MD(C),
Bo Angela Wan¹, MPhil,
Stephanie Chan¹, BSc(C),
Paul A Smith², MD, Alexia Blake³, MSc,
Amiti Wolt³, BA, Liying Zhang¹, PhD,
Henry Lam¹, MLS,
Carlo DeAngelis¹, PharmD,
Marissa Slaven³, MD, Erynn Shaw³, MD,
Vithusha Ganesh¹, BSc(C),
Pearl Zaki¹, BSc(C), Leah Drost¹, BSc(C),
Nicholas Lao¹, BMSc(C),
Leila Malek¹, BSc(Hons),
Edward Chow¹, MBBS,
and Shannon O’Hearn^{3,*}, MSc

¹Odette Cancer Centre, Sunnybrook Health Sciences Centre, University of Toronto, Toronto, Ontario

²Dr Paul Smith Professional Corporation, Fredericton, New Brunswick

³MedReleaf, Markham, Ontario, Canada

⁴Juravinski Cancer Centre, Hamilton Health Sciences, Hamilton, Ontario, Canada

Abstract

Post-traumatic stress disorder (PTSD) is a mental illness that commonly affects military and police service veterans after experiencing traumatic events throughout their service. Alcohol and tobacco are often overused by this population to help relieve the symptoms of PTSD. The objective of this paper is to examine if alcohol and tobacco use in military and police service veterans with PTSD changed after using medical cannabis for PTSD symptom management. A retrospective chart review was conducted to analyse information about alcohol, tobacco, and medical cannabis use, as well as previously attempted PTSD treatment methods. 101 patients (average age 43 years, 96.0% male, 60.4% married, and 81.2% with children) who visited a single treatment center between January 2014 and April 2016 were included in this study. The most common treatments patients tried prior to using medical cannabis included self-treatment with non-medical cannabis (87.8%), medication for depression (86.6%) and anxiety (85.4%), and psychotherapy (82.9%). At baseline, 81.2% consumed alcohol (average 8.1 drinks/week) and 84.2% smoked tobacco cigarettes (average 2.7 packs/week). At follow-up, 67.3% consumed alcohol (average 5.5 drinks/week) and 67.3% smoked tobacco cigarettes (average 2.5 packs/week). The use of medical cannabis was correlated with a reduction in alcohol and tobacco use. However, statistical significance was not reached ($p = 0.11$ and $p = 0.65$, respectively). Medical cannabis has the potential to reduce alcohol or tobacco use in PTSD patients. Further investigation is required to understand how medical cannabis can alleviate PTSD-related symptoms, and to identify its impact on other lifestyle factors, such as tobacco and alcohol consumption.

Keywords: Post-traumatic stress disorder, medical cannabis, veterans, alcohol, tobacco

Introduction

Post-Traumatic Stress Disorder (PTSD), as defined by the “Diagnostic and statistical manual of mental disorders, 5th edition” (DSM-V), is a debilitating

* Correspondence: Ms Shannon O’Hearn MSc, MedReleaf Corp, Markham Industrial Park, Markham ON, Canada. E-mail: sohearn@medreleaf.com

mental illness caused by experiencing or witnessing traumatic events such as sexual assault, violence, or personal grief. Symptoms of this condition include re-experiencing the pain and psychological stress of previous trauma, numbing or avoidance, and negative cognitions and mood (1).

Due to the nature of their lines of duty, military and police service veterans are more likely to experience PTSD than the general civilian population. In a literature review by Zamorski et al. of mental health within the Canadian Armed Forces, the prevalence of PTSD ranged from 2.1% to 8.1% in a study population of 8,400 personnel (2). Over a 4-year follow-up, 8% to 20% of Canadian Forces veterans were diagnosed with PTSD at some point during their service (2).

There is strong evidence suggesting that individuals with PTSD experience poorer health outcomes that reduce their quality of life (QOL) compared to individuals who do not have PTSD (3). For example, Rapaport et al. (4) reported that 59% of PTSD patients have clinically significant severe impairments in QOL items compared to non-PTSD populations, as defined by two or more standard deviations below the community norm. QOL reductions in PTSD populations are even more severe than patients with panic disorder, obsessive compulsive disorder, and social phobia (4). In military and police veterans with PTSD, a deterioration in QOL, in combination with chronic symptoms of PTSD can lead to social or occupational impairment, resulting in an inability to successfully resume a civilian lifestyle (4).

Population studies in the United States have revealed associations between nicotine and alcohol dependence in individuals with psychiatric disorders (5). According to the DSM-V guidelines, nicotine or alcohol dependence is defined as the presence of at least 2 out of 11 criteria that evaluate characteristics of nicotine or alcohol intake (1). Breslau et al. (6) reported that in persons with PTSD, there is an increased risk of nicotine dependence, as PTSD patients may find that nicotine helps them cope with PTSD-related symptoms (6). Despite anecdotal evidence suggesting that alcohol is often used to cope with their symptoms as well, there is mixed evidence regarding the risk of alcohol abuse or dependence in individuals with PTSD (6,7).

Conventionally, PTSD is treated and managed with pharmacotherapy and psychotherapy. Common pharmacotherapies include tricyclic antidepressants, adrenoceptor agonists or antagonists, anticonvulsants, antipsychotics, selective serotonin reuptake inhibitors (SSRIs), and monoamine oxidase inhibitors (7). However, traditional pharmacotherapy is inconsistently effective for treating combat-related PTSD compared to civilian PTSD, possibly due to the chronic nature of combat-related PTSD. In comparison, psychotherapy may be a more consistently effective treatment option for patients with all types of PTSD, often resulting in significant symptom improvements (3,8–14). Meta-analyses of 26 studies of the efficacy of psychotherapy treatments ranging from 3-52 hours in length suggested that over 67% of PTSD patients no longer met the criteria for PTSD after treatment completion (9).

Recently, medical cannabis has emerged as an effective alternative treatment option for patients suffering from PTSD, particularly among the military veteran population. While its efficacy is beginning to be formally investigated in this population, the current literature lacks evidence supporting whether the use of medical cannabis specifically reduces alcohol and tobacco use in military and police veterans with PTSD. The objective of this study was to address this gap in the literature to understand whether the use of medical cannabis is correlated with a reduction in alcohol and tobacco use in Canadian military and police veterans with PTSD.

Methods

A retrospective chart audit was conducted at a single medical practice in New Brunswick, Canada, with experience in managing PTSD in military veterans. The charts of 101 patients who had begun treatment with medical cannabis between January 2014 and January 2016 were assessed in this study. These patients had a confirmed diagnosis of PTSD, served in the military or police service, and had failed previous attempts of pharmacotherapy and psychotherapy. Patients were started on a medical cannabis dose of 1 gram/day, and self-titrated until desired results were met. Daily doses did not exceed 10 grams/day.

Data collection

Patient charts were retrospectively reviewed to analyze information recorded at baseline (initial visit) and at first follow-up. At baseline, demographic information including age, gender, marital status, number of children, length of military or police service, family history of medical conditions, and past medical histories were recorded. In addition, medications (type and dose), and weekly alcohol and tobacco use were documented. Patients were also asked to describe their history of PTSD, whether they experienced pain as a symptom, the location of pain on their body, and to rate the efficacy of previous treatments for PTSD symptoms on a scale of 1 to 10, with 10 being most effective. Previous treatments that were rated included psychotherapy, relaxation therapy, exercise programs, nutrition therapy, medications for anxiety, medications for depression, self-treatment with non-medical cannabis, and isolation to a place in nature.

At follow-up, information including time to follow-up, current medications (type and dose), previous treatment efficacy, presence of pain, and location of pain were documented. Details of medical cannabis use including the duration of cannabis use, median daily dose, method of cannabis administration (smoking, vaping, or eating), and cannabis strain(s) used were recorded. Finally, alcohol consumption and tobacco consumption per week were reported.

Statistical analysis

Changes in the average score and significance for outcome across all participants from baseline to the first follow-up were analyzed. For each outcome, any patient responses in the form of a numerical range (ex. “6-8 out of 10 for shoulder pain”) were represented by the median. A two-tailed unpaired *t*-test was used to analyze alcohol and tobacco use between baseline and follow-up, with significance defined as $p < 0.05$.

Results

Table 1 shows baseline demographic data of the 101 patients assessed. Patients were primarily male (96.0%) and on average 43 years old. Over sixty percent were married, 14.9% were in a common-law relationship, 11.9% were either divorced/separated or single, and the relationship status of 1.0% was unknown. Of the 81.2% of patients who had children, the average number of children per patient was 2.2.

The average length of military and police service of patients involved in this study was 16.2 years. Patients most commonly had a family history of diabetes (32.7%), cancer (29.7%), heart disease (19.8%), depression (11.9%), high blood pressure (6.9%), and PTSD (5.9%).

Table 1. Baseline information on patient demographics

Demographics (Total n = 101)	n (%)
<i>Average age (years)</i>	43 (SD = 9.8)
<i>Sex</i> (Total n = 101)	97 Male (96.0%)
<i>Marital status</i>	
Married	61 (60.4%)
Common law	15 (14.9%)
Divorced/separated	12 (11.9%)
Single	12 (11.9%)
Unknown	1 (1.0%)
<i>Children</i>	
Number of patients with children	82 (81.2%)
Average number of children	2.2 (SD = 1.0)
<i>Military service</i>	
Average length of military/ police service (years)	16.2 (SD = 7.8)
<i>Common family history of medical illness</i>	
Diabetes	33 (32.7%)
Cancer	30 (29.7%)
Heart disease	20 (19.8%)
Depression	12 (11.9%)
High blood pressure	7 (6.9%)
Post-traumatic stress disorder	6 (5.9%)
<i>Common locations of pain</i> (Total n = 89)	
Back	50 (62.1%)
Shoulder	28 (31.5%)
Knee	28 (31.5%)
Neck	20 (22.5%)
Ankle	11 (12.4%)

SD = standard deviation.

Table 1 shows that out of the 89 patients experiencing pain at baseline, most patients reported experiencing pain in their back (62.1%), shoulder

(31.5%), knee (31.5%), neck (22.5%), and ankle (12.4%). The average time to follow-up with patients was 8.25 months (SD = 4.9).

Previous treatment prevalence and effectiveness

Previous treatments are listed in Table 2, and include self-treatment with non-medical cannabis (87.8%), medication for depression (86.6%), medications for

anxiety (85.4%) and psychotherapy (82.9%), no treatment (69.5%), isolation to a place in nature (67.1%), exercise programs (63.4%), relaxation therapy (51.2%), and nutrition therapy (24.4%). The self-perceived efficacies of these treatments ranged widely. The three most effective treatment methods include self-treatment with non-medical cannabis (efficacy score = 8.5), isolation to a place in nature (efficacy score = 6.6), and psychotherapy (efficacy score = 5.2).

Table 2. Prevalence and effectiveness of previous PTSD treatments (Total n = 82)

Treatment	n (%)	Average score (0-10)	SD
Self-treatments with non-medical cannabis on your own	72 (87.8%)	8.53	2.34
Medication for depression	71 (86.6%)	3.99	2.68
Medication for anxiety	70 (85.4%)	4.24	2.81
Psychotherapy	68 (82.9%)	5.15	2.66
No treatment	57 (69.5%)	2.94	2.91
Isolation to a place in nature	55 (67.1%)	6.64	3.26
Exercise programs of any sort	52 (63.4%)	5.00	2.79
Relaxation therapy (ex. Meditation, Yoga)	42 (51.2%)	4.26	2.94
Nutrition therapy	20 (24.4%)	1.90	2.72

SD = Standard deviation.

Table 3. Preferred method of medical cannabis use (Total n = 97)

Method of use	n (%)
Vaporize	80 (82.5%)
Smoke	77 (79.4%)
Oral consumption	63 (64.9%)

Table 4. Top 5 preferred varieties of medical cannabis by patients and characteristics (Total n = 86)

Variety	n (%)	Composition	% THC	% CBD	\$/gram
<i>Luminarium</i> ^{MR}	31 (36.0%)	Very <i>sativa</i> -dominant	25 - 28%	0	12.5
<i>Sedamen</i> ^{MR}	28 (32.6%)	<i>indica</i> -dominant	21 - 24%	0	12.5
<i>Avidekel</i> ^{MR}	24 (27.9%)	<i>sativa</i> -leaning	8 - 11%	11 - 14%	12.5
<i>Midnight</i> ^{MR}	23 (26.7%)	<i>indica</i> -leaning	0.1 - 0.8%	15 - 18%	12.5
<i>Remissio</i> ^{MR}	21 (24.4%)	<i>indica</i> -dominant	24 - 27%	0	12.5

THC: Tetrahydrocannabinol; CBD: cannabidiol.

Table 5. Average alcohol (and tobacco use at baseline and follow-up)

Alcohol use (drinks/week)		
Baseline (n = 81)	Follow-up (n = 81)	p-value
8.1 (SD = 10.7)	5.5 (SD = 9.5)	0.11
Tobacco use (packs/week)		
Baseline (n = 68)	Follow-up (n = 68)	p-value
2.7 (SD = 2.9)	2.5 (SD = 3.1)	0.65

SD = standard deviation.

Medical cannabis use

The median daily dose patients reported to be using at follow-up was 10 grams/day. Table 3 shows that the preferred methods of administration included vaporization (82.5%), smoking (79.4%), and eating (64.9%). The top five varieties of cannabis supplied from *MedReleaf Corp.* that patients perceived provided the greatest relief overall include *Luminarium^{MR}* (36.0%), *Sedamen^{MR}* (32.6%), and *Avidekel^{MR}* (27.9%) (see Table 4).

Improvement in alcohol and tobacco use

At baseline, patients reported consuming an average of 8.1 drinks/week, compared to 5.5 drinks/week at follow-up ($p = 0.11$, Table 5). Patients consumed an average of 2.7 packs/week at baseline, compared to 2.5 packs/week at follow-up ($p = 0.65$). Neither of these changes reached statistical significance.

Discussion

PTSD is a debilitating disorder caused by witnessing or experiencing a traumatic event, and has a lifetime prevalence of 9.2% in Canada (10). PTSD is more prevalent in military and police veteran populations since they are more likely to be exposed to traumatic events during their service in comparison to the civilian population (10). PTSD may manifest as a variety of symptoms such as depression and pain, as well as dependence on substances such as alcohol and tobacco. These have long-term psychosocial consequences as well as a negative impact on QOL (5, 12, 13).

PTSD patients may be at an increased risk of nicotine and alcohol dependence, as defined by the DSM-5. Breslau et al. reported that an increased prevalence of nicotine dependence observed in PTSD patients may be due to the ability of nicotine to help patients cope with their PTSD symptoms of re-experiencing trauma and hyper-arousal (6, 7, 13). Nicotine dependence is linked to an increased risk of short-term and long-term health outcomes through affecting the respiratory and gastrointestinal systems, as well as cognition (5, 15, 16).

Twin studies have identified PTSD as a significant risk factor for alcohol dependence, possibly due to its ability to help patients cope with PTSD symptoms such as insomnia (6, 16). Alcohol dependence adversely impacts health through negatively affecting cognition and causing liver damage (17). As PTSD patients may be more prone to alcohol and tobacco dependence, there is a higher risk that this patient group will encounter additional health problems, which may further impact their QOL and general wellbeing (14). Moreover, Cocker et al. (24) found that among veterans with PTSD, there was a correlation between a three-way reduction of PTSD symptoms, substance abuse issues, and violent behaviour, suggesting a synergistic mechanism underlying these issues (24). Therefore, management of PTSD symptoms as well as reduction of substance dependence is critical for improving the overall health of these patients.

Medical cannabis is emerging as an effective alternative treatment option for the management of a wide variety of symptoms, including those associated with PTSD. The results presented in this study suggest that the use of medical cannabis may also lead to a reduction in tobacco and alcohol use in veteran PTSD patient populations. It is important to further investigate the short and long-term effects of medical cannabis on alcohol, tobacco, and possibly other substance abuse, especially since PTSD patients may display a higher tendency to develop alcohol and tobacco dependency (12). While the present study provides valuable insight into the potential of medical cannabis to reduce alcohol and tobacco use in military and police veterans experiencing PTSD, further research is required to understand the complete effects of medical cannabis on symptom management and substance abuse mitigation in both PTSD and non-PTSD populations.

The literature portrays mixed evidence regarding the efficacy of traditional treatment methods such as psychotherapy and pharmacotherapy for managing PTSD-associated symptoms (9, 18, 19). Similarly, patients in this study reported varying efficacies of other forms of treatment, many of which had limited success and therefore led patients to seek further treatment at this center (see Table 2). However, since patients included in this study were military and police veterans, the results of this study may not be

directly applicable to non-veteran subgroups of the PTSD patient population.

Several limitations apply to this present study. First, this study was limited to a single centre under the supervision of a single physician. As patients were only referred to this center if they failed pharmacotherapy and psychotherapy, this sample population displaying treatment resistance may not be representative of all veterans or civilians with PTSD. Additionally, some patients had missing or incomplete data for certain outcomes and dosages of PTSD-related medications, which may also have affected study observations. Outcomes were also recorded by the physician based on consultation with the patient, and objective validated tools were not used, potentially introducing biases into the data. In the future, larger study cohorts, consistent follow-up intervals, and the use of objective tools to collect symptom and QOL related measures will help further the understanding of whether the use of medical cannabis has significant impacts on alcohol and tobacco use patients with PTSD.

Conclusion

The results from this retrospective chart review provide early findings that cannabis may be an effective treatment option for military and police veterans with PTSD, especially those who did not respond to other conventional therapies. Although statistical significance was not observed, medical cannabis use in this cohort was correlated with a reduction in alcohol and tobacco use. Further research is required with larger populations and study controls to determine the efficacy of medical cannabis in managing PTSD-related symptoms and as a long-term method for mitigating substance abuse in both PTSD and non-PTSD patient populations.

Acknowledgments

We thank the generous support of Bratty Family Fund, Michael and Karyn Goldstein Cancer Research Fund, Joey and Mary Furfari Cancer Research Fund, Pulenzas Cancer Research Fund, Joseph and Silvana Melara Cancer Research Fund, and Ofelia Cancer

Research Fund. This study was conducted in collaboration with MedReleaf.

References

- [1] American Psychiatric Association. Trauma- and stressor-related disorders. In: Diagnostic and Statistical Manual of Mental Disorders, Fifth edition. Arlington, VA: American Psychiatric Association, 2013.
- [2] Zamorski MA, Boulos D. The impact of the military mission in afghanistan on mental health in the Canadian Armed Forces: A summary of research findings. *Eur J Psychotraumatol* 2014;5.
- [3] Mendlowicz M V, Stein MB. Reviews and Overviews Quality of Life in Individuals With Anxiety Disorders. *Psychiatry Interpers Biol Process* 2000;157(5):669–82.
- [4] Rapaport MH, Clary C, Fayyad R, Endicott J. Quality-of-Life Impairment in Depressive and Anxiety Disorders. *Am J Psychiatry* 2005;162(6):1171–8.
- [5] Grant BF, Hasin DS, Chou SP, Stinson FS, Dawson DA. Nicotine dependence and psychiatric disorders in the United States. *Arch Gen Psychiatry* 2004;61(11):1107-15.
- [6] Breslau N, Davis GC, Schultz LR. Posttraumatic stress disorder and the incidence of nicotine, alcohol, and other drug disorders in persons who have experienced trauma. *Arch Gen Psychiatry* 2003;60(3):289–94.
- [7] Veteran Administration. PTSD and substance abuse in veterans, 2014. URL: http://www.ptsd.va.gov/public/problems/ptsd_substance_abuse_veterans.asp.
- [8] Steckler T, Risbrough V. Pharmacological treatment of PTSD: Established and new approaches. *Neuropharmacol* 2012;62(2):617–27.
- [9] Bradley R, Ph D, Greene J, Russ E, Dutra L, Westen D, et al. Reviews and Overviews A Multidimensional Meta-Analysis of Psychotherapy for PTSD. *Am J Psychiatry* 2005;162:214–27.
- [10] Van Ameringen M, Mancini C, Patterson B, Boyle MH. Post-traumatic stress disorder in Canada. *CNS Neurosci Ther* 2008;14(3):171–81.
- [11] Walsh Z, Callaway R, Belle-Isle L, Capler R, Kay R, Lucas P, et al. Cannabis for therapeutic purposes: Patient characteristics, access, and reasons for use. *Int J Drug Policy* 2013;24(6):511–6.
- [12] Feldner MT, Babson KA, Zvolensky MJ. Critical Review of the Empirical Literature. October 2008;27(1):14–45.
- [13] Stewart SH, Mitchell TL, Wright KD, Loba P. The relations of PTSD symptoms to alcohol use and coping drinking in volunteers who responded to the Swissair Flight 111 airline disaster. *J Anxiety Disord* 2004;18(1):51–68.
- [14] McFarlane AC. Epidemiological evidence about the relationship between PTSD and alcohol abuse: The

- nature of the association. *Addict Behav* 1998;23(6):813–25.
- [15] Babson KA, Feldner MT, Sachs-Ericsson N, Schmidt NB, Zvolensky MJ. Nicotine dependence mediates the relations between insomnia and both panic and posttraumatic stress disorder in the NCS-R sample. *Depress Anxiety* 2008;25(8):670–9.
- [16] Koenen KC, Hitsman B, Lyons MJ, Niaura R, McCaffery J, Goldberg J, et al. A twin registry study of the relationship between posttraumatic stress disorder and nicotine dependence in men. *Arch Gen Psychiatry* 2005;62(11):1258–65.
- [17] World Health Organization. Alcohol. Geneva: WHO, 2015. URL: <http://www.who.int/mediacentre/factsheets/fs349/en/%0Afiles/372/en.html>.
- [18] Hetrick SE, Purcell R, Garner B, Parslow R. Combined pharmacotherapy and psychological therapies for post traumatic stress disorder (PTSD). *Cochrane Database Syst Rev* 2010;7:CD007316.
- [19] Foa E, Meaows EA. Psychosocial treatments for posttraumatic stress disorder: A critical review. *Annu Rev Psychol* 1997;48:449–80.

Submitted: January 23, 2017. *Revised:* February 18, 2017.
Accepted: February 27, 2017.