



# Medical cannabis in pediatric oncology: a survey of patients and caregivers

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## Abstract

**Background** There are minimal data regarding the safety and efficacy of cannabis used as an anti-cancer agent or for symptom management in pediatric oncology. We aimed to characterize the prevalence and factors associated with the use of cannabis for the treatment of cancer and management of cancer-related symptoms in children during or after cancer treatment.

**Methods** An anonymous 40 question paper survey was offered to patients/caregivers of children with cancer attending a pediatric oncology clinic in a provincially mandated cancer agency between October 2019 and March 2020.

**Results** There were 64 respondents included in the analysis. Fourteen participants ( $N=14/64$ ; 22%) reported use of cannabis, of which half used cannabis for either cancer treatment or symptom management, or both. Leukemia ( $n=9/14$ ; 64%) was the most frequent diagnosis in children whose caregivers reported using cannabis and the majority of them were still receiving active cancer treatment ( $N=5/9$ ; 56%). All of the respondents using cannabis (14/14, 100%) experienced symptom improvement. Most of the caregivers procured cannabis from their friends ( $N=5/14$ ; 36%), and oil was the most commonly used formulation ( $N=12/14$ ; 86%). Cannabis-related information was received from another parent ( $N=4/14$ ; 29%) or from a doctor ( $N=4/14$ ; 29%). The reported monthly expenditure on cannabis varied widely from less than \$50 CAD ( $N=4/14$ ; 29%) to more than \$500 CAD ( $N=3/14$ ; 21%).

**Conclusions** Our survey shows that cannabis, mostly oil products, was used by one-fifth of children with cancer during or after the completion of cancer treatment. These findings require validation in a larger nationwide survey.

**Keywords** Cannabis · Medical marijuana · Pediatric oncology · Symptom management

## Introduction

Cannabis has been historically used as a healing herb and mind-altering plant since ancient times and is currently approved in many countries including Canada since October 2018 for

recreational and medicinal use [1]. Cannabinoids are approved for clinical use in adult cancer-associated nausea/vomiting and neuropathic pain, multiple sclerosis, epilepsy (Lennox-Gastaut syndrome, Dravet syndrome), and anorexia/weight loss due to AIDS and cancer [2–5].

The use of cannabis as an anti-cancer agent has been studied in in vitro and in pre-clinical models [6–10]. In pre-clinical models of adult lung and pancreatic cancer, as well as clinical trials of adult brain cancer, cannabinoids in combination with conventional treatment regimens have shown to enhance the therapeutic efficacy [7–11]. There are scattered reports in the literature of use of cannabis in pediatric oncology, although mostly examining potential roles for symptom management and patient/provider perspectives [12–14]. Despite the limited data, as many as 80% of the children and parents reported a high level of satisfaction in cannabis use with relief in both physical and psychological cancer-related suffering [15]. Benefits were most commonly reported in control of nausea and vomiting, sleep, mood stabilization, and pain relief [15].

## Presentation

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In the last few years, there have been anecdotal increases in the use of cannabis as a therapeutic and symptom management agent for children with cancer [14]. However, this use is not supported by the existing scientific literature. Despite the lack of evidence, many medical providers are now providing recommendation to patients including formulation choice and dosage for the above indications [12, 14, 16]. This in turn, has further increased the use of cannabis in children for various conditions [13, 16]. Cannabis use can be potentially detrimental to the health of children due to uncertain drug quality, unknown drug interactions, incorrect dosing, adverse reactions, and long-term neuro-cognitive side effects [17, 18].

The aims of this pilot study were to look at the prevalence of cannabis use in children diagnosed with cancer; to describe the epidemiological and treatment-related factors associated with its use; and to learn about the informational resources and financial implication of cannabis use in cancer.

## Methods

All children with cancer and their caregivers attending the pediatric oncology outpatient clinic at CancerCare Manitoba, between October 2019 and March 2020, were eligible to complete an anonymous paper survey adapted from Martell et al. [16]. Also included in the survey were childhood cancer survivors (up to 30 years of age) who attended the long-term childhood cancer survivorship clinic. Patients over the age of 14 years were allowed to complete the survey without caregiver involvement. The survey described patient demographics, diagnosis, personal opinions, use and source of cannabis, and comfort level in discussing cannabis with their oncologist. Parental education level and parental use of cannabis were also included in the survey (Supplement-I). Participation in this study was voluntary. Participants were approached by nursing staff at CancerCare Manitoba. Once surveys were completed, they were placed by the participant in a sealed envelope with no identifiers into a confidential box.

Questions in which the reported impacts of cancer were queried originally included response options of strongly agree, agree, disagree, strongly disagree, and don't know/unsure. For analysis purposes, we collapsed these categories into agree (strongly agree, agree), disagree (disagree, strongly disagree), or unsure. Respondents who reported answers of both agree and disagree to a single question were classified as unsure, as we were unable to determine if this was a reporting error or if respondents had mixed beliefs about the question. Data are described using frequencies and percentages using Stata 15.1 (College Station, TX, USA). Approval for this study was granted by the Health Research Ethics Board at the University of Manitoba, as well as CancerCare Manitoba's Research Resource Impact Committee (REB#H2019:232, RRIC# 2019:021).

## Results

**Survey demographics** A total of 69 questionnaires were returned, of which 5 were excluded due to incomplete responses or illegible handwritten data. Of the 64 responses, most of the respondents were caregivers (39/64; 61.0%; Table 1). The majority of patients were 18 years or older (26/64; 40.6%) and between 9 and 17 years of age (24/64; 37.5%). Leukemia (37/67; 57.8%) was the most common diagnosis, with most (48/64;

**Table 1** Demographics and clinical characteristics of the study population (N=64)

	<i>n</i>	%
Participant characteristics		
Survey respondent		
Patient	14	21.8%
Parent/guardian	39	60.9%
Patient and parent/guardian	10	15.6%
Not reported	1	1.6%
Patient's age group		
0–8 years	13	20.3%
9–17 years	24	37.5%
18 years or older	26	40.6%
Not reported	1	1.6%
Patient's sex		
Male	34	53.1%
Female	30	46.9%
Patient's education		
Grades K–8	13	20.3%
Grades 8–12	20	31.2%
Post-secondary	3	4.7%
Does not attend school	27	42.2%
Not reported	1	1.6%
Parent's highest level of education		
High school	16	25.0%
College	13	20.0%
Bachelor's	14	21.8%
Master's	5	7.8%
Doctorate or professional	2	3.1%
Some or no high school	4	6.2%
Not reported	10	15.6%
Cancer		
Type of cancer*		
Leukemia	37	57.8%
Brain tumor	15	23.4%
Bone tumor	1	1.6%
Neuroblastoma	1	1.6%
Lymphoma	2	3.1%
Other	5	7.8%
Not reported	4	6.7%
Time since cancer diagnosis (N=56)		
<6 months	8	12.5%
>6 months	48	75.0%
Not reported	8	12.5%
Active cancer treatment		
No	40	62.5%
Yes	24	37.5%
Cannabis		
Reported cannabis use in any form		
No	50	78.1%
Yes	14	21.9%

\*Total is 102% as one child had 2 forms of cancer (leukemia and lymphoma)

75.0%) diagnosed more than 6 months prior to completing the survey. Most patients were not receiving active cancer treatment (40/64; 62.5%). Approximately one-fifth of respondents (14/64; 21.8%) reported using cannabis in any form (Table 2). Nearly half of these respondents reported use of cannabis for both cancer treatment and symptom management (6/14; 42.8%). Respondents who were off treatment (5/14; 35.7%) reported use for symptom management which was similar to those on treatment (9/14; 64.3%). Of the fifty patients/caregivers not using cannabis, seventeen (17/50; 34.0%) thought about using cannabis as part of their treatment. Of these seventeen, two (2/17; 11.7%) caregivers reported a personal history of cannabis use.

**Characteristics of patients/caregivers using cannabis** Males and females were equally represented in those who reported

cannabis use. Leukemia was the most common diagnosis among patients using cannabis (9/14; 64.3%). The majority of patients using cannabis had been diagnosed more than 6 months prior and were on active treatment compared to non-users (9/14; 64.3% vs 15/50; 30.0%). The 14 patients reporting cannabis use sourced their cannabis from friends (5/14; 35.7%), dispensary or commercial sources (4/14; 28.6%), prescription (4/14; 28.6%), or other sources (non-government agencies) (3/14; 23.1%; Table 3). Cannabis was mostly consumed in oil form (12/14; 85.7%). Daily dose was reported by a variety of methods including weight, volume, and by THC:CBD ratio, and free text. All caregivers/patients using cannabis reported improved symptoms (14/14; 100%), particularly pain (10/14; 71.4%). Two patients reported a mixed response with improvement in some symptoms and worsening in others. Cannabis-related

**Table 2** Characteristics of participants who reported using cannabis and those who did not report cannabis use ( $N=64$ )

	Reported cannabis use ( $N=14$ )		Did not report cannabis use ( $N=50$ )	
	<i>n</i>	%	<i>n</i>	%
Participant characteristics				
Respondent				
Patient	4	28.5%	10	20.0%
Parent/guardian	5	35.7%	34	68.0%
Patient and parent/guardian	4	25.8%	6	12.0%
Not reported	1	7.1%	0	0%
Child's age group				
0–8 years	3	21.4%	10	20.0%
9–17 years	5	35.7%	19	38.0%
18 years or older	6	42.9%	40	80.0%
Not reported	0	0%	1	2.0%
Sex				
Male	7	50.0%	27	54.0%
Female	7	50.0%	23	46.0%
Cancer				
Type of cancer*				
Leukemia	9	64.3%	28	56.0%
Brain tumor	3	21.4%	12	24.0%
Bone tumor	0	0%	1	2.0%
Neuroblastoma	0	0%	1	2.0%
Lymphoma	0	0%	2	4.0%
Other	1	7.1%	4	8.0%
Not reported	1	7.1%	3	6.0%
Time since diagnosis				
<6 months	2	14.3%	6	12.0%
>6 months	10	71.4%	38	76.0%
Not reported	2	14.3%	0	0%
Active treatment				
No	5	35.7%	35	70.0%
Yes	9	64.3%	15	30.0%

\*Total is 102% as one child (who did not report using cannabis) had 2 forms of cancer

**Table 3** Sources, forms, costs, and impact of cannabis on symptoms (N=14)

	<i>n</i>	%
<b>Reasons for cannabis use</b>		
Symptom management only	1	7.1%
Symptoms and anti-cancer treatment	6	42.9%
Other	6	42.9%
<b>Reason for use not reported</b>		
“Other” reasons for cannabis use	1	7.1%
To feel good	1	7.1%
Recreational	3	21.4%
Depression	1	7.1%
Panic attacks	1	7.1%
Anxiety	1	7.1%
Sleep	2	14.3%
Appetite	1	7.1%
Pain	2	14.3%
<b>Sources of cannabis*</b>		
Friend	5	35.7%
Dispensary/commercial source	4	28.6%
Prescription	4	28.6%
Other	3	21.4%
<b>Form of cannabis*</b>		
Oil	12	85.7%
Edibles	5	35.7%
Inhaled	7	50.0%
Spray	0	0%
Capsules	1	7.1%
Other	1	7.1%
<b>Duration of cannabis use</b>		
Less than 1 week	2	14.3%
Less than 1 month	1	7.1%
Less than 6 months	4	28.6%
More than 6 months	7	50.0%
<b>Improvement of symptoms on cannabis</b>		
Yes	14	100%
No	0	0%
<b>Symptom improvement attributed to cannabis*</b>		
Pain	10	71.4%
Nausea and vomiting	8	57.1%
Appetite	8	57.1%
Sleep	3	21.4%
Other	2	14.3%
<b>Worsening of symptoms on cannabis</b>		
Yes	2	14.3%
No	10	71.4%
Not reported	2	14.3%
<b>Worsening of symptoms attributed to cannabis*</b>		
Pain	1	7.1%
Nausea and vomiting	1	7.1%
Appetite	2	14.3%

**Table 3** (continued)

	<i>n</i>	%
Sleepiness	2	14.3%
Fuzzy head/dizzy	0	0%
Diarrhea	1	7.1%
Red eyes	1	7.1%
Other	1	7.1%
<b>Sources of information about cannabis</b>		
Internet	2	14.3%
Television	0	0%
YouTube	0	0%
Doctor	4	28.6%
Parent of another patient	4	28.6%
Other	4	28.6%
<b>Money spent on cannabis per month</b>		
<\$50	4	28.6%
\$50 to \$500	6	42.9%
>\$500	3	21.4%
Prefer not to answer	1	7.1%

\*Percentages exceed 100% as participants provided multiple responses

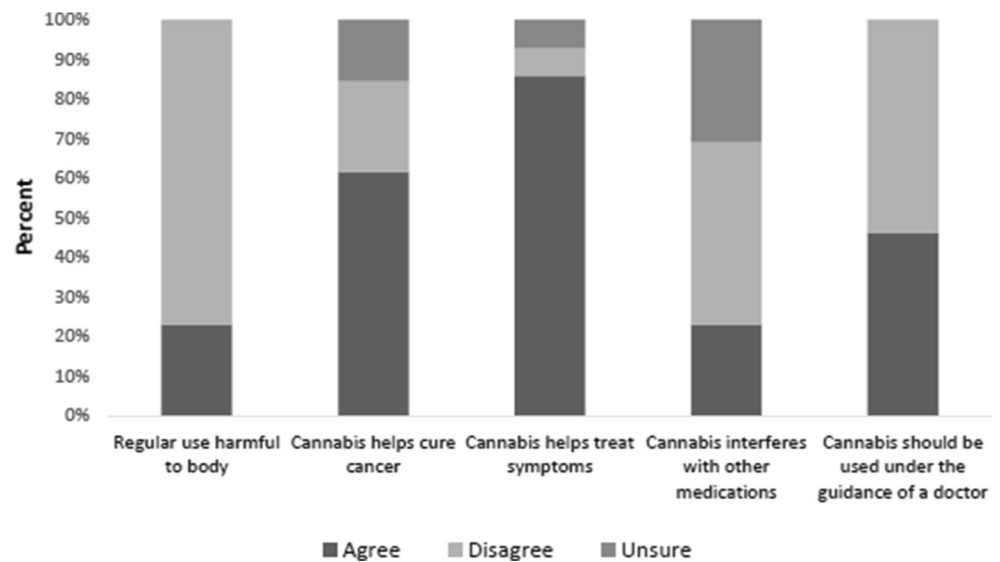
information was almost exclusively received from a doctor (4/14; 28.6%) or a parent of another patient (4/14; 28.6%). Nearly all cannabis users/caregivers (12/14; 85.7%) discussed cannabis with their oncologist. The two patients who reported cannabis use but who did not discuss it with their oncologist cited [1] the concern of disagreement regarding cannabis use ( $n=1$ ) and [2] the stigma associated with the use of cannabis in children ( $n=1$ ) as reasons for not discussing. Money spent on cannabis per month varied widely. Four (28.6%) participants reported spending less than \$50 CAD, whereas 3 participants (21.4%) spent more than \$500 CAD per month on cannabis products.

**Perceptions of patients/caregivers regarding cannabis use in pediatric oncology** Compared to patients not using cannabis, more patients using cannabis disagreed with the statements that regular use is harmful (10/14; 71.4% vs. 16/50; 32.0%) and that cannabis should only be used under the guidance of a doctor (7/14; 50.0% vs 9/50; 18.0%). More patients using cannabis agreed that they believe that cannabis cures cancer (8/14; 57.1% vs 12/50; 24.0%) compared to those not using cannabis (Fig. 1). The majority of patients felt comfortable discussing cannabis with their doctor (43/64; 67.2%); however, 60.9% (39/64) would discuss cannabis only if it was brought up by their physician.

## Discussion

Our pilot study demonstrates that cannabis is being used by children with cancer for both symptom control and for the

**Fig. 1** Reported impacts of cannabis use in those reporting use



treatment of cancer. One-fifth of the patients included cannabis as part of their treatment plan, a percentage that is congruent to data obtained from the adult oncology population in Canada [19]. All patients using cannabis believed that the addition of cannabis to their treatment plan led to improvement of symptoms. These results are consistent with the results reported by Ofir et al. [15]. Our findings along with data from literature [15, 20] suggest that cannabis may help in symptom management in the pediatric oncology population. These findings need to be validated in a randomized clinical trial.

The most common formulation by which cannabis was used is oil with respondents spending anywhere from fifty to five hundred dollars a month to obtain cannabis. As cannabis use in Canada is not approved for children, families are incurring this as an out-of-pocket expense. This cost may be an unnecessary burden for the families as there is no data regarding the safety, efficacy, and dosing of cannabis in children with cancer.

The majority of patients using cannabis were obtaining information regarding its use and dosage from a doctor or another parent. With the lack of data regarding safety and efficacy of cannabis as anti-cancer agents or for symptom control in the pediatric population, it is unclear how ethically one can provide information on indications and dosage to these families [21]. Despite the lack of evidence, studies suggest that 92% of physicians remain open to helping their patient's access cannabis [14]. This knowledge gap highlights the urgent need for further studies to determine the safety and efficacy of cannabis, and for the regulatory monitoring of those prescribing cannabis [14, 16, 22]. In our cohort, when dosage information for cannabis was not obtained from a physician, it was commonly sourced from a friend or family member. This raises the additional question of the impact of information obtained from sources outside of a medical professional on a family's response and decision to use cannabis. A scoping review of the open access articles available online reported that the majority of articles available on cannabis

are authored by journalists and are pro-cannabis [23]. This highlights the need to have easily accessible evidence-based data on cannabis available to patients to ensure they have access to unbiased information.

Both dosage and ingredients (THC: CBD) of cannabis used by patients in our study varied widely. Many patients were unable to identify proportion of THC and CBD in their product or a consistent dosage being used. Patients using CBD oil tended to provide more specific details on ratio of components and dosage. The wide variability in dosage re-emphasizes the lack of information available and need for further research.

The caregiver perception of cannabis use in the pediatric oncology population varied widely based upon whether or not a family was using cannabis. Families not using cannabis as part of their treatment plan were less likely to disagree with the statement that regular use of cannabis is harmful, and were more unsure regarding cannabis's ability to cure cancer or manage symptoms. Patients and caregivers who personally used cannabis were more confident that cannabis does not interfere with other medications. In this study, the majority of patients were open to discussing cannabis use with their oncologist suggesting that pediatric oncologists are open to discuss the topic; however, the differing patient and caregiver responses underscore the importance of having open communication with all patients.

The major strength of our study is the first ever documentation of cannabis use in pediatric oncology patients from a Canadian perspective. The study highlights the increasing use of cannabis in children with cancer by their caregivers and illustrates associated benefits and adverse effects experienced by this group. We acknowledge the small sample size of this study; however, it was intended to be a pilot study. Limitations of the study include the risk of underreporting cannabis use out of fear or legal repercussions. To alleviate patient/caregivers' concerns, we took careful steps to minimize the likelihood of their identification. The



incidence of progressive or recently relapsed disease was not collected which may influence the choice to use cannabis. Also, the questionnaire was adapted from an adult cannabis survey for pediatric use and has not been clinically validated, with the potential for recall bias [19].

In conclusion, this pilot study provides evidence that cannabis is being used by pediatric oncology patients for symptom control of their cancers. This finding is in agreement with similar studies previously completed [15, 16, 20]. Unique to our survey is identification of this population using cannabis as a cancer therapeutic, as well as information around formulation choice, sources of information/prescription, and the financial burden associated with cannabis use. Our data along with other studies support the urgent need for ongoing research into the safety and efficacy of cannabis, and prescribing practices in the pediatric oncology population. Further research will help to streamline the use of cannabis and ensure it is being used in situations with proven efficacy balancing its use against the known long-term psychiatric and neuro-cognitive side effects [21–24]. We plan to validate the findings of this pilot study through a larger nationwide survey.

**Abbreviations** CBD, Cannabidiol; THC, Tetrahydrocannabinol

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s00520-021-06202-z>.

**Code availability** N/A

**Author contribution** All authors contributed to the concepts, conduct, analysis, and writing of this manuscript, have reviewed, and agree upon the contents of this manuscript.

**Data Availability** N/A

## Declarations

**Ethics approval** Approval for this study was granted by the Health Research Ethics Board at the University of Manitoba, as well as CancerCare Manitoba's Research Resource Impact Committee (REB#H2019:232, RRIC# 2019:021).

**Consent to participate** N/A

**Consent for publication** N/A

**Conflict of interest** The authors declare no competing interests.

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