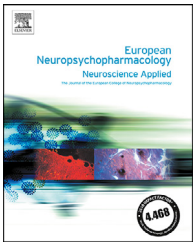
European Neuropsychopharmacology (2020) 36, 244–254



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Experiences with medical cannabis in the treatment of veterans with PTSD: Results from a focus group discussion

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Received 31 October 2019; received in revised form 5 March 2020; accepted 23 April 2020

KEYWORDS
PTSD;
Medical cannabis;
Cannabinoids;
Patient experiences;

Abstract
Posttraumatic stress disorder (PTSD) is an often chronic condition for which currently available medications have limited efficacy. Medical cannabis is increasingly used to treat patients with PTSD; however, evidence for the efficacy and safety of cannabinoids is scarce. To learn more about patients' opinions on and experiences with medical cannabis, we organized a focus group discussion among military veterans ($N = 7$) with chronic PTSD who were treated with medical cannabis. Afterwards, some of their partners ($N = 4$) joined the group for an evaluation, during which they shared their perspective on their partner's use of medical cannabis. Both sessions were audio-recorded, transcribed verbatim, and analyzed by means of qualitative content analysis. Five overarching themes were identified. The first four themes related to the

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https://doi.org/10.1016/j.euroneuro.2020.04.009
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Qualitative research;
Focus group discussion

different phases of medical cannabis use – namely, 1) Consideration; 2) Initiation; 3) Usage; and 4) Discontinuation. The fifth theme related to several general aspects of medical cannabis use. Patients used medical cannabis to manage their symptoms and did not experience an urge to "get high." They used a variety of different cannabis strains and dosages and reported several therapeutic effects, including an increased quality of sleep. Furthermore, discussions about the experienced stigma surrounding cannabis generated insights with implications for the initiation of medical cannabis use. These results underscore the value of qualitative research in this field and are relevant for the design of future clinical trials on the use of medical cannabis for the treatment of PTSD.
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1. Introduction

Posttraumatic stress disorder (PTSD) is a debilitating condition that is characterized by re-experiencing, avoidance, and hyperarousal symptoms that have developed following a traumatic experience (Yehuda et al., 2015). Military veterans are particularly vulnerable and experience higher rates of PTSD than other populations (Lyk-Jensen et al., 2016; Xue et al., 2015). A significant number of these patients do not fully recover from PTSD (Bryant et al., 2016; Steenkamp et al., 2015), resulting in an enormous burden on the personal, social and economic levels (Kessler, 2000). Despite demonstrations of numerous neurobiological alterations and thus potential drug targets in PTSD (Shalev et al., 2017; Vermetten et al., 2018), only two medications (i.e., paroxetine and sertraline) have been approved for its treatment. Both paroxetine and sertraline have demonstrated limited efficacy (Cipriani et al., 2018). Furthermore, little progress has been made in the search for effective drugs with new mechanisms of action (Krystal et al., 2017). Recently, there has been an increased interest in the use of cannabinoids for the treatment of PTSD (Hill et al., 2018; Ney et al., 2019).

The most well-known source of cannabinoids is cannabis. Cannabis contains more than 100 different cannabinoids, of which tetrahydrocannabinol (THC) and cannabidiol (CBD) are the most extensively studied (Berman et al., 2018). Cannabis has been used by patients to counter symptoms of PTSD, with anecdotal evidence of success. Several studies have reported improvements in PTSD symptoms with the use of cannabis (Greer et al., 2014; Passie et al., 2012; Reznik, 2012), oral THC (Roitman et al., 2014), and the synthetic cannabinoid nabilone (Cameron et al., 2014; Fraser, 2009; Jetly et al., 2015). However, most of these studies had several methodological limitations, and a meta-analysis and review have shown no evidence of effectiveness (Black et al., 2019; Steenkamp et al., 2017).

Despite the lack of evidence on the safety and efficacy of cannabinoids for the treatment of PTSD, the growing acceptance and availability of medical cannabis (Krcevski-Skvarc et al., 2018) and the significant percentage of PTSD patients who do not or only partially respond to the currently available pharmaco- and psychotherapeutic treatments (Cipriani et al., 2018; Lee et al., 2016), have led to an increased interest in the use of medical cannabis by patients with a diagnosis of PTSD (Davis et al., 2018). Although there is little consensus on both the potential therapeutic effects and risks of medical cannabis use in this population, the often chronic and debilitating nature of PTSD and the lack of treatment alternatives, have led some practitioners to prescribe medical cannabis off-label to their patients.

This situation offers an opportunity to collect qualitative data on patients' opinions on and experiences with medical cannabis for the treatment of PTSD. With this aim in mind, we organized a focus group discussion with patients who were prescribed medical cannabis for the treatment of PTSD.

2. Experimental procedures

A focus group discussion was used as a qualitative approach to assess patients' experiences with the use of medical cannabis for the management of their PTSD symptoms. The Medical Research Ethics Committee of the University Medical center Utrecht confirmed that the Medical Research Involving Human Subject Act did not apply to this study (WAG/mb/19/013711). The Institutional Review Board of the Utrecht Institute for Pharmaceutical Sciences reviewed and approved the study protocol (UPF1902). All patients provided written informed consent.

Since 2018, medical cannabis has been prescribed to veterans treated by their psychiatrist (EV) at the National Dutch Military Mental Health Service, in cases of chronic PTSD associated with frequent nightmares and insomnia. Only patients who had not sufficiently responded to multiple previous pharmacotherapeutic and psychotherapeutic interventions qualified for medical cannabis prescription.

A total of 10 patients had started treatment with medical cannabis at the start of this study. To our knowledge, this comprises the total population of veterans with PTSD currently treated with medical cannabis within the Military Mental Health Service in the Netherlands. All patients received an invitation to participate, to which all responded positively. After the patients had confirmed their interest in participating, they were sent an email with additional information about the focus group and were contacted by phone by one of the researchers (EK/DJ). During this initial telephone call, any remaining questions were addressed. These telephone calls were also initiated with the purpose of building rapport between the researchers and patients. Seven of the 10 PTSD patients were available to attend the focus group discussion. The other three patients were unable to attend due to logistical reasons. These three patients did express their wish to participate in future studies and did not differ on any obvious demographic factors or PTSD characteristics.

The two-hour focus group discussion (which included a 15-minute break) took place at the Dutch Veterans Institute in Doorn, the Netherlands. The focus group was conducted by three facilitators: the prescribing psychiatrist (EV), a psychologist/researcher

Table 1 Patient characteristics.

Name	Age	Diagnosed (years)	Currently using cannabis	Duration of medical cannabis use	Cannabis strain (form)	THC% / CBD%	Route of administration	Dose per day	Dosing schedule
Dave	59	21	No	3 months	Bediol (oil)	THC 1.3% / CBD 2.0%	Sublingual	No data	No data
Adam	60	9	Yes	10 years	Homegrown (granulate) **	Unknown	Inhalation (smoking)	1.4 gs	In the evening
Jim*	42	15	Yes	1 year	Bedrocan (granulate) Bedica (granulate)	THC 22% / CBD <1% THC 14% / CBD <1%	Inhalation (smoking, vaporizing)	0.8 gs	Every hour
George*	52	8	Yes	4 months	Bediol (oil)	THC 1.3% / CBD 2.0%	Sublingual	7 drops	Before sleep
Harald*	58	21	Yes	6 months	Bediol (oil)	THC 1.3% / CBD 2.0%	Sublingual	10 drops	Before sleep
Bernie	48	15	Yes	6 months	Bedrocan (oil)	THC 2.0% / CBD <0.1%	Sublingual	3 drops	Before sleep
Peter*	66	4	Yes	3 weeks	Bediol (oil)	THC 1.3% / CBD 2.0%	Sublingual	4 drops	Before sleep

THC, tetrahydrocannabinol; CBD, cannabidiol.
* Partner joined the evaluation after the focus group discussion.
** Patient used homegrown cannabis to manage his PTSD symptoms and did not have a current prescription of medical cannabis.

(EK) and a pharmacist/researcher (DJ). Before the actual discussion started, patients were asked to complete a questionnaire addressing demographic and medical cannabis use characteristics (i.e., specific cannabis strain, route of administration, and dosage) and length of time since the PTSD diagnosis. During the focus group discussion, several topics of interest were introduced: 1) the use and administration of medical cannabis, 2) the effects of medical cannabis, 3) comparisons with other medications, 4) stigma, and 5) availability of medical cannabis. These topics were identified a priori by the research team based on their clinical relevance and existing knowledge gaps, and they were discussed in a semi-structured but flexible manner to maximize the potential for an open and rich discussion to develop. After the focus group was concluded, the group, including partners accompanying the patients, had dinner together. This was followed by an additional 30-minute evaluation, with partners included.

The focus group and the evaluation with the partners were audio-recorded and subsequently transcribed verbatim in the original language to preserve the intended meaning of the patients' responses. The transcripts were imported and analyzed using NVivo (version 12.5.0.815, QRS International, Melbourne, Australia). Data were analyzed using qualitative content analysis – a mixed inductive and deductive approach for analyzing qualitative data. Two authors (EK/DJ) coded the transcripts independently and identified meaningful themes and subthemes. Thereafter, the identified themes were discussed among all the authors and adjusted in a cyclic process to achieve consensus. At the last stage of this process, all five authors (EK/DJ/ERH/TE/EV) met in person during a 2-hour meeting to compose the final list of themes, including identified overarching themes. All names used in this report are pseudonyms and the transcript text has been edited to remove vocalized pauses and filler utterances.

3. Results

The seven patients who participated in the focus group discussion were all male, and their ages ranged from 42 to 66 years. The four partners of the patients were all female. Six patients were currently using medical cannabis; one had stopped. Patients took different dosages of several cannabis strains with varying ratios of THC and CBD, using various routes of administration. Most of them administered medical cannabis sublingually in the form of an oil before sleep, while others took it through a method of inhalation throughout the day. For a characterization of the patients, see Table 1.

Five overarching themes were identified from the focus group discussion with the patients and the evaluation thereof with patients and partners. The identification of the major overarching themes was based upon strong similarities with the process and phases of medication taking identified in other studies (see Vrijens et al., 2012). Four themes were related to the different phases of medical cannabis use – namely, 1) Consideration, 2) Initiation, 3) Usage, and 4) Discontinuation. A fifth overarching theme was related to several general aspects of medical cannabis use, such as the availability of medical cannabis and the need for information. These five overarching themes contained several subthemes (Fig. 1).

3.1. Consideration phase

3.1.1. Experiences with previous treatment

All patients mentioned negative experiences with other medicines taken during previous treatments. They experienced insufficient effects from pharmacotherapy as well as multiple side effects. They felt overmedicated and expressed feeling inappropriately treated with medication for years.

Peter: "The problem with those regular medicines is if it doesn't work, then one more is added."

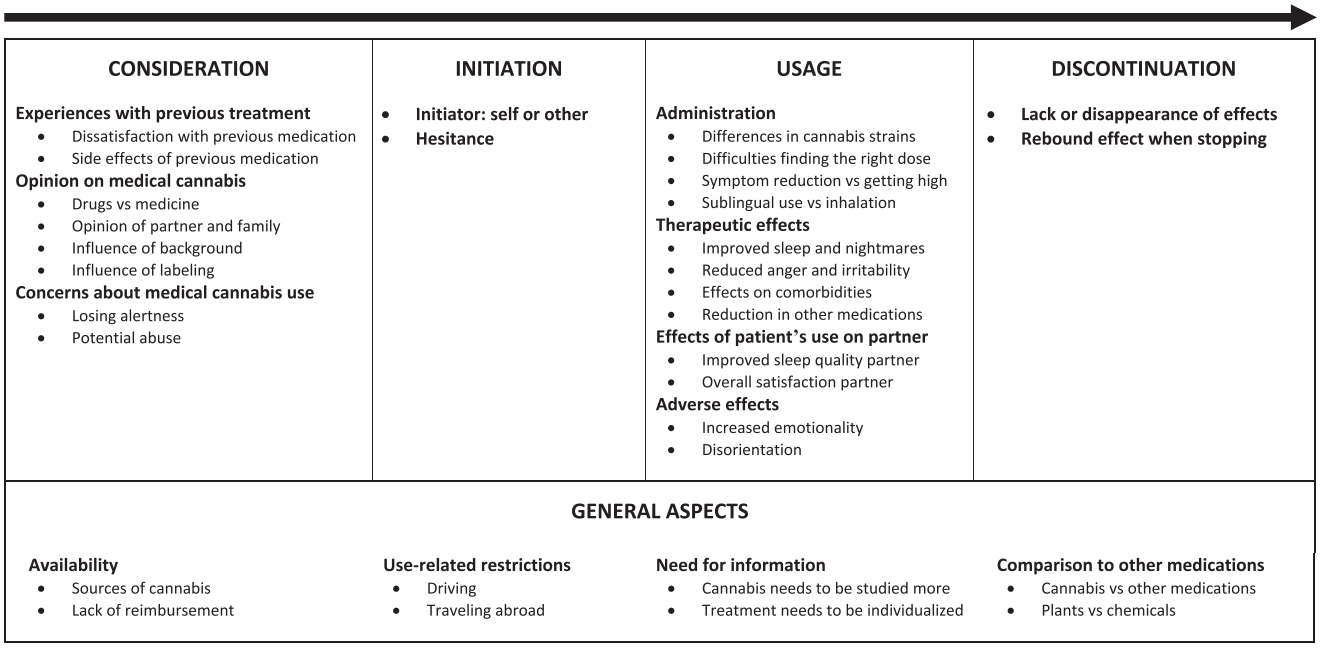

Fig. 1 Identified themes and subthemes; the arrow indicates the steps in the use of medical cannabis.

Bernie: "Yes."

Dave: "Or the dose is doubled!"

Peter: "Or a different brand or name is prescribed. And then the dose is increased again. You feel dazed all day."

Peter's partner: "The medication, with all its side effects, it didn't get us anywhere."

The side effects of previous pharmacotherapy were mentioned to have had a great impact. Patients felt like they had a hangover all day, or did not feel like themselves anymore. In addition, liver and kidney problems, stomach pain, numbness, a feeling of drunkenness, and disorientation were also reported. Furthermore, patients mentioned problems with tapering and withdrawal symptoms when stopping medication.

Jim: "I noticed the chemicals. I was in bed in the evening, and I just lay with my hands on my stomach, just because the pills made me sick."

George and Bernie: "Yes."

Dave: "I was numbed by the painkillers and sleeping pills."

George and Jim: "Yes, exactly!"

Peter: "You sit on the couch like a potato."

Dave: "At a certain point, you just become like a plant. Then you just sit behind the window."

Jim: "Yes, I don't want that anymore. I seriously don't want that anymore!"

Dave: "That is the problem with regular medicines."

3.1.2. Opinion on medical cannabis

Before treatment was started, opinions on medical cannabis varied among the patients. For some, the use of a potential drug of abuse as medicine was a significant issue. Such a perception of cannabis was often related to the place where they were raised. For one patient, his youth was spent in a neighborhood with drug dealers, and he did not feel comfortable with using a medicine that he perceived as a drug of abuse. Others had simply never heard of cannabis being used for medical purposes.

Bernie: "I come from a small village, and weed didn't exist in our town. We liked barley and hops a lot better. Then I thought, 'Barley, hops, coffee… in fact all medication comes from nature.' When I used medical cannabis for the first time I thought, 'Now I've lost it; I've abandoned my faith. I can never say that I haven't used drugs anymore.'"

Others felt more comfortable using cannabis. They started using cannabis long before their psychiatrist prescribed it.

Jim: "I have no problems with cannabis. I know a lot of people who smoke weed. Actually, I know more people who use cannabis than those who don't. And they really aren't people who live on the street."

How the patients' family, partner, or children would perceive cannabis use was an important topic as well.

Bernie: "But George has a different problem – he needs to consult with his wife. They told their son for years that he was not allowed to smoke that much weed, and now dad uses cannabis himself."

George's partner: "It took me a long time to see medical cannabis as a medicine. I never used drugs myself; I don't even drink alcohol. So for me it was difficult. Those [medical cannabis] are drugs for me. A negative atmosphere."

Those patients who initially did not feel comfortable with using medical cannabis mentioned that they experienced less stigma around cannabis oil. The oil was perceived as more clinical compared to smoking cannabis; it seemed more like taking a medicine and less like a drug for recreational use. The way patients labeled cannabis contributed to the way they perceived it as well.

Bernie: "I also never call it 'weed oil'; it is CBD oil or Bedrocan. Well, it [the stigma] is all in my head."

3.1.3. Concerns about medical cannabis use

Some patients and partners had concerns around medical cannabis use, such as a fear of losing alertness or of abusing cannabis.

George: "Given my past of drug abuse and alcohol abuse, [I am concerned] that you [my partner] might have a problem with me smoking cannabis on the couch."
Jim's partner: "At first I thought, 'Oh my god, he will become addicted to it.'"

3.2. Initiation phase

3.2.1. Initiator: self or other

Some patients already had a history of using cannabis for medicinal purposes before they received a prescription for medical cannabis from their psychiatrist. For most other patients, it was the psychiatrist who suggested medical cannabis initiation. In some cases, partners played a role as well.

Harald's partner: "He needed to make the choice by himself, not me."
Peter's partner: "The thought just entered me on our way to the psychiatrist, and I said, 'Peter, I think this [use of medical cannabis] could be something for you.'"

3.2.2. Hesitance

For some of the patients, time passed between the first proposal to use medical cannabis as a treatment option and the start of medical cannabis use because of the stigma they experienced around it.

Harald: "It took me two years before I said 'yes' to the treatment. Because it is drugs, so I didn't look for more information."
Harald's partner: "It was our prejudice."

3.3. Usage phase

Two extensively discussed topics related to the usage phase were the administration and effects of medical cannabis.

3.3.1. Administration

Patients used a range of different strains, routes of administration, and dosages of medical cannabis. One patient mentioned the existence of a wide variety of cannabis strains and the importance of that.

Adam: "I know there is an enormous amount of difference between plants, that there are many different compounds in them, and that it is very important that you know which one is appropriate for what."

Patients also referred to different strains in terms of different cannabinoid ratios.

Jim: "I'm using two kinds of medical cannabis now [Bedica and Bedrocan]. One contains 22% THC and less than 1% CBD, and the other one contains 14% THC and less than 1% CBD […]. The one with the highest THC is for during the day."

When one patient mentioned that he did not experience much of an effect from his use of medical cannabis, others suggested that he should try another strain.

Dave: "It doesn't have any effect on me. I've used [cannabis] oil with THC. I tried many different things [but it doesn't work]."
Jim: "You must be using the wrong strain. It doesn't suit your constitution."

Several different routes of administration were discussed during the focus group. Most of the patients used medical cannabis sublingually in the form of an oil, and some patients used it through a method of inhalation. Several reasons for a preference for oil were mentioned.

Bernie: "I have the idea that with the oil it is a bit more controlled […] You will receive a prescription, start with this amount, increase with this and that amount after a certain amount of days, until a maximum of…"
Harald: "I always thought that you had to smoke it, and if there is one thing that I don't want to do it is smoking […] But then he [the psychiatrist] said that you can also use it as an oil. So [I decided], let's give it a try."

A few patients preferred to smoke the cannabis – because of both the quicker onset of effects and the ability to more easily reach an optimal dose.

Jim: "The problem with the oil is that it needs to go through your system. Smoking is instant. Within three minutes you have an effect. With the oil, it takes longer. When I'm experiencing panic, I cannot use oil because it takes too long [before it has an effect]."
Jim: "The oil is also very concentrated. [When I smoke it,] I can decide myself how strong it will be. With the oil […] It is very difficult to find the sweet spot."

Some of the other patients who were taking cannabis oil agreed that it was a challenge to arrive at the optimal dose.

George: "Yes. With drops, I find it very difficult to find the *optimal dose."*
Bernie: "I also experienced *that. I went from 10, to 6 to 3, to 2, and now I'm at 3 drops before sleep. That's when it's the most beneficial to me."*

The patients were all on different doses of medical cannabis. Most patients used the same amount each day, but some also tailored their dose depending on their needs.

Jim: "It also depends on how I feel. When I have a headache, I will start low, and I will wait for 15 min. When I feel it lessens, I will stop. But when I don't notice much, then I might use some more."

The majority of patients only used cannabis before sleep. Some also used it during the day. The patients all agreed on the importance of finding the optimal dose that would allow them to function, without "getting high" or becoming impaired.

Jim: "You should not use it to get stoned. That's not what I'm using it for […] I use it every hour. As constantly as possible […] I'm talking about milligrams. [Using it this way,] you will stay at a baseline level. That's the best method."

Bernie: "Yes, I have the opinion that with this substance, you should be able to dose in such a way that you can just go to your work."

Jim: "That you can function as optimally as possible…"

Bernie: "Exactly! That is the goal."

3.3.2. Therapeutic effects

Patients reported a wide range of therapeutic effects from cannabis. The most frequently discussed effect was cannabis' beneficial impact on sleep quality and nightmares.

Peter: "The nights are much calmer […] and, therefore, I'm also more calm the next day […] Otherwise, it would be busy in my head all the time, but not anymore."

Adam: "I have much more calm nights. I'm not sweating anymore."

Adam: "I experience much fewer nightmares and flashbacks."

Jim: "Absolutely!"

Jim: "My sleep is calmer. When I'm in bed in the evening, I'm just calmly thinking, instead of having thoughts going through my head like crazy all the time."

Bernie: "I'm also waking up by myself, exactly at 7 a.m. That's something I did not experience for many years […] In the past, I woke up around 10 a.m. or 1 p.m., but now I just sleep for 8 h, and done. My children are sitting at the table [for breakfast], and I'm there with them."

For some patients, the effects on sleep were less noticeable or obvious.

Harald: "I'm not sleeping much longer, but I do sleep better, I think. But I'm not completely sure."

Other benefits that were reported by several patients included increased relaxation and a reduction in anger or irritability.

Adam: "It relaxes me physically and psychologically. I'm less easily triggered, so to say."

George: "I'm less easily irritated."

Peter: "To me, it is a wonder drug. My head is calm, and it is not like a carnival anymore."

Several patients also reported experiencing increased energy or feeling more fit.

Adam: "I even feel more fit. It is like I have more energy."

Bernie: "Yes, I also feel more fit."

A benefit of cannabis use that was also reported by several patients was its effects on pain – especially headaches.

Harald: "Besides PTSD, I also have cluster headaches. [Cannabis] also reduces the pain a little. So it helps for both […] If my pain normally is around 8 [on a scale from 1 to 10], now I experience a pain of around 6."

Jim: "I'm also a headache patient […] My pain reduction is at least 40%. There were days [before using cannabis] during which I was pulling my hair all day long, squeezing my shoulders. I did the craziest things. And now I take some cannabis and I'm calm. It is the most perfect medicine to me."

One partner confirmed the reduction in her partner's headaches when he used cannabis.

Jim's partner: "When he had intense headaches, he would be showering for hours. Now, when I give him some cannabis, it is gone within four minutes."

However, not everyone had experienced pain reduction.

Bernie: "My body hurts like crazy. All my muscles are tight, but it doesn't do anything for that […] But, like you said, you need to find the right dose."

Several patients reported that they had reduced the dose of their regular medications or stopped using them.

Jim: "I stopped using all other medications. Once a month, I still take a sleeping pill, but overall, the only thing I need is cannabis. Nothing else. No medications, no sleeping pills, nothing at all."

Harald: "I can take one sleeping pill less. That is also important to me."

3.3.3. Effects of the patient's use on the partner

Initiating medical cannabis use was experienced as positive by all partners. This positive perception related to aspects such as increased sleep quality and general satisfaction with the effects of medical cannabis on PTSD symptoms.

Peter's partner: "What I see with Peter is that my nights are calmer. He is sleeping well. I don't have a wet bed [from his sweat] anymore. And he is calmer."

Peter's partner: "For me, it actually is like a gift from heaven […] For me, it is a new start, with a lot of hope."

3.3.4. Adverse effects

Patients did not report many adverse effects or disadvantages to using cannabis. The main unpleasant effects that were reported were related to taking too much cannabis.

Bernie: "When I take too much, I can get emotional. That's very strange to me. I don't know that at all. Then I'm crying on the couch, and my wife is looking at me like, 'What is this?' And I think, 'Yes, what is this?'"

Harald: "With too many drops, when I need to get out at night, I can feel really lost […] I feel disoriented."

3.4. Discontinuation phase

3.4.1. Lack or disappearance of effects

Of the seven patients who participated in this focus group discussion, one had decided to stop using medical cannabis three months after initiation.

Dave: "The first three weeks, it went well. I felt relaxed; I slept better. But then suddenly the effects disappeared […] I persisted for three months […] I tried cannabis oil, I tried several things, but it didn't work […] I could use as many drops as I wanted […] I don't know if it has something to do with my constitution […] I never respond well

to medications. I use it for a while, and then, suddenly, the effects are gone."

3.4.2. Rebound effect when stopping

Two patients mentioned that their nightmares returned when they stopped taking cannabis.

Adam: "I had to go to the hospital for some examination because of my sleep apnea. I did not use cannabis that time […] Yes, I had nightmares and panic […] I'm not sure if it had to do with it [not using cannabis]."

Bernie: "I've been experimenting [with not taking cannabis]. And then the nightmares return indeed […] I know that when I will stop taking cannabis, it will go in the wrong direction again."

3.5. General aspects

Several themes were not related to one of the four stages of medical cannabis use. These themes were classified under a separate category.

3.5.1. Availability

An important theme was the availability of medical cannabis. Patients with a medical cannabis prescription had their cannabis delivered at home by a pharmacy. The experiences were very positive.

Peter: "It's easy to receive the cannabis from the pharmacy. They have a nice delivery service […] Each half hour you get a notification about the estimated time of arrival."

One patient was growing his own cannabis at home. He knew someone with extensive knowledge on cannabis cultivation who was giving him advise.

Adam: "For a while, I was getting my cannabis from a center for which the quality of cannabis was checked by the university. At some point they closed down, and then I decided to start growing it myself. I know someone who has a lot of knowledge about this […] This person also has a shop where he advises people with cancer or brain damage what would be the best [strain] for them to use. Based on his advice, I'm growing my own cannabis from seed […] At home I have a little tent with five plants. Plus, I also like doing it."

During the discussion, patients also referred to other sources of cannabis, such as semi-legal cannabis dispensaries, which, in the Netherlands, are called "coffeeshops". Patients were very outspoken about the quality of cannabis available from coffeeshops and indicated that they did not make use of them.

Adam: "I have to say, the cannabis in the coffeeshop, you really need to be careful with that. They add all kinds of stuff."

Jim: "Yes, absolutely! A quality mark on everything, but not on this [cannabis]!"

Bernie: "Maximum revenue, but they don't care about the [people smoking it]."

Jim: "[What we use] is medical, but what you buy in the coffeeshop…"

Adam: "Once, I went to a coffeeshop, and I thought, 'What am I doing here?' [I realized] that there are criminals behind this […] I don't want to contribute to that […] That's why I grow it myself."

Most patients were no longer reimbursed for medical cannabis by their healthcare insurance; others were anticipating that their reimbursement would soon be discontinued.

Harald: "At this point, I'm still getting it reimbursed. However, I received a letter stating that they will stop reimbursing it at the end of this year […] because they don't see it as a medicine."

Bernie: "I've had it reimbursed two times. And then [they stopped]. But it is prescribed and comes from the pharmacy?"

Jim: "They don't care about that."

3.5.2. Use-related restrictions

Some potential limitations with regards to medical cannabis use were discussed as well. These were related to driving and to traveling abroad. Some patients still chose to drive, especially because they only took cannabis at night, before sleep. Others did not drive, but this was mainly due to the other medications that they were taking. Two of the patients did sometimes drive when under the influence of cannabis. Both experienced it as something that did not impair them.

Peter: "I take it before sleep. In the morning, you do not have any side effects from that. I think with the conventional medications […] that those were more dangerous."

Harald: "I do still drive a car, but not alone. Definitely not in the early morning. I'm sure that I cannot do that. Definitely not with all the other medications that I'm still taking…"

Jim: "I still drive, but not as much as in the past. If it has an influence on my driving ability? […] I say it has a minimal effect. Minimal to none."

Adam: "If you go to the coffeeshop without having any experience and then drive a car, yes, then it might go wrong […] I also know people who are getting really high and then drive a car. I don't think that is a good idea."

Opinions varied on taking medical cannabis abroad. Some experienced it as something to be careful with, while others thought it was not a problem.

Peter: "When they would open my suitcase, and they see it, then I would like to have some [paperwork showing that I have a prescription for medical cannabis]."

Jim: "They don't make a problem out of it."

Bernie: "I wouldn't take it to [some countries]*…"*

Jim: "Oh yes, I will bring it with me all over the planet."

3.5.3. Need for information

During the discussion, it became clear that patients felt they could benefit from more knowledge about the use of medical cannabis for PTSD.

Bernie: "Actually, it is just a good product. But yes, what we are doing, you have to study it."

Bernie: "We are realizing now that you need to look specifically at each person, what they need. That is clear

to me […] We will continue to [explore the potential of medical cannabis].”

George: “I have the impression that I’m not getting the most out of it…”

3.5.4. Comparison to other medications

The last general sub-theme that emerged from the focus group discussion related to patients comparing cannabis to other substances – mainly medication that they took for their PTSD in the past. Without exception, they experienced medical cannabis as having much fewer side effects than conventional medications.

Peter: “[With other medications] the dose was so high that I was sitting on the couch like a zombie […] Now I wake up feeling fresh, and my whole outlook on the day is different.”

Bernie: “I feel more like myself again. I’m more direct. I say things like ’Listen, this isn’t right, or that isn’t right’. Other medications have continually repressed that.”

Peter’s partner: “And I think that the chemical stuff that he was taking before, is actually worse than cannabis. With its side effects and chemical compounds.”

Jim: “Cannabis is the most ideal medicine that I’ve ever had. In comparison with pills, they can just throw them away.”

4. Discussion

This paper has presented the results from a focus group discussion that aimed to unravel PTSD patients’ opinions on and experiences with medical cannabis. By applying qualitative content analysis, we identified four themes related to different phases of medical cannabis use: consideration, initiation, usage, and discontinuation. A fifth overarching theme was related to several general aspects of medical cannabis use. In the following discussion, we highlight some of the relevant themes and subthemes that were identified.

Patients emphasized that they perceived cannabis as a medicine that could help them manage their PTSD symptoms. They stressed the importance of using cannabis in a way that would allow them to function better, and did not report any urge to “get high.” The perception of cannabis as a medicine versus a drug of abuse played a central role during the consideration phase before initiation. For several patients, cannabis was initially seen as a recreational drug, which created a mental barrier to medical cannabis use. Deciding to initiate medical cannabis use was often reported to be a gradual process, during which patients experienced some hesitance. Partners had a significant influence on this process, which underscores the importance of the involvement of partners or close relatives during medical cannabis initiation.

Lack of therapeutic effect and/or experienced side effects with conventional medication played an important role in patients’ decisions to consider cannabis as a potential treatment alternative. Patients expressed a wish to reduce or stop the use of other medications, and some reported having done so. They reported minimal side effects of medical cannabis and strongly favored it over many of the other medications that they had used in terms of the ratio of therapeutic effects to side effects. However, this general sentiment could have emerged due to the sample consisting of patients who had been dissatisfied with previous treatments.

Reported therapeutic effects ranged from reduced anger and irritability to increased sleep quality and reductions in nightmares and night sweats. Nightmares and associated insomnia are a major problematic symptom in many patients with PTSD, and currently available medications are often not adequately effective in alleviating these symptoms (Nappi et al., 2012). Studies examining the effects of several cannabinoids on improvement of sleep and reduction of nightmares have shown promising results, but have lacked the scientific rigor needed to provide conclusive evidence (Cameron et al., 2014; Fraser et al., 2009; Jetly et al., 2015; Roitman et al., 2014).

Despite the overall positive experiences in this sample, cannabis use was also associated with potential risks, including the potential for abuse. Although all patients reported no significant adverse effects, one patient had some concerns related to his history of medication and alcohol abuse, which is not uncommon in patients with PTSD (Gilpin and Weiner, 2017; Homish et al., 2019). Several studies have shown a strong link between PTSD and cannabis use disorder (Hasin et al., 2016), which can possibly be explained by the use of cannabis due to coping-motives (Bonn-Miller et al., 2007). Whether such use should be classified as problematic or as self-medication probably depends on the specific circumstances of each unique case. Although some studies have found an association between cannabis use disorder and poor treatment outcomes in PTSD patients (Bonn-Miller et al., 2013; Wilkinson et al., 2015), monitored prescription of medical cannabis in controlled dosages cannot be compared to excessive and unsupervised use of cannabis from unknown sources.

Several patients reported being well informed and aware of the different cannabis strains. Most of the cannabis grown for the recreational market has been cultivated to contain mainly THC, at the expense of CBD and other cannabinoids (ElSohly et al., 2016). High levels of THC increase the probability of adverse effects, including anxiety (Martín-Santos et al., 2012), memory impairment (Ranganathan and D’Souza, 2006), and psychosis (DiForti et al., 2015, 2019). However, CBD has been shown to counter several of the potential adverse effects of THC (Crippa et al., 2009; Englund et al., 2013; Freeman et al., 2019). The majority of patients in this study used strains with relatively low percentages of THC and high percentages of CBD (i.e., Bediol), which might be a preferred ratio in a population of vulnerable PTSD patients. However, some patients used strains with a high percentage of THC and a low percentage of CBD (e.g., Bedrocan) and reported benefiting from the use of these strains without experiencing any significant side effects. Regardless of the strain patients were using, most of them seemed to agree that treatment needs to be individualized. They believed that if one strain does not have optimal effects or induces certain adverse effects, another strain should be tried.

Dosages of medical cannabis also varied among the individuals, ranging from 3 drops of Bediol oil before sleep to approximately 1 g of inhaled Bedrocan granulate taken throughout the day. Although the bioavailability and

pharmacokinetics of these different routes of administration vary (Brown et al., 2019), the net amount of THC could differ by an estimated 200-fold. Despite the fact that it is not possible to directly compare different strains, in different forms, administered at different frequencies, this shows the complexity of medical cannabis prescription. Furthermore, the anxiolytic effects of THC seem to be dose-dependent, with THC potentially becoming anxiogenic at higher doses (Crippa et al., 2009). These complexities could also explain why some patients in this study reported difficulties finding the right dose – for example, experiencing anxiolytic effects at one dose and increased emotionality at another.

Potential use-related restrictions were also reported, such as driving. The majority of patients still drove a car and said that their medical cannabis use did not impair their ability to drive. Although for most patients this absence of impairment was related to the fact that they only used cannabis before sleep, some patients also drove a car after cannabis use during the day. In the Netherlands (and most other countries), detection of any level of cannabinoids or cannabinoid metabolites by law enforcement officials could have legal repercussions. As these metabolites are detectable long after medical cannabis has been used (Grotenhermen, 2003), we feel that this issue is important to discuss and study given the increasing levels of medical cannabis prescription around the world.

This study had several limitations. First, due to the small population of veterans with PTSD with a prescription for medical cannabis in the Netherlands, only a single focus group was organized. Second, our study included mainly patients with a current prescription for medical cannabis, potentially resulting in a selective sample of patients who responded well to medical cannabis. Only one patient had discontinued medical cannabis use because of insufficient therapeutic effect. Third, the prescribing psychiatrist was present during the focus group discussion because the participants were recruited from a psychologically vulnerable patient population. Although his presence could have biased the results in some ways, we felt that the presence of the psychiatrist was desirable to create a sense of trust and safety and to contribute to an open discussion between patients and their partners. In future studies, other medical cannabis prescribers could be identified, and a variety of PTSD subpopulations could be included, including patients with less favorable experiences with medical cannabis. By organizing multiple focus groups, researchers could identify other themes, and achieve data saturation within this particular treatment population. This approach could help to create a more complete picture of PTSD patients' experiences with medical cannabis use. However, we believe it is important for the field to learn about patients' experiences with medical cannabis at this early stage already, due to the increasing interest in and availability of medical cannabis for this indication. Especially considering the significant number of patients with PTSD that do not respond well to the currently available treatments.

To our knowledge, this was the first study to use a focus group approach to study PTSD patients' experiences with medical cannabis. We believe these results can be of value to clinicians considering prescribing medical cannabis to patients with PTSD or for other indications. In addition, our findings could be useful in the design of future qualitative and quantitative studies on the use of medical cannabis for the treatment of PTSD.

Role of the funding source

Funding for this study was provided by the Nypels-Tans PTSD Fund at Leiden University. The Nypels-Tans PTSD Fund played no further role in the study design; the collection, analysis, and interpretation of data; the writing of the report; or the decision to submit the paper for publication.

Contributors

Authors EK, DJ, ERH, EV, and TE designed the study. EK, DJ, and EV wrote the protocol and prepared and facilitated the focus group discussion. EK and DJ undertook the qualitative data analysis, while all authors were involved in the final stage of analysis to reach consensus on the themes. EK wrote the first draft of the manuscript. All authors contributed to and approved the final manuscript.

Declaration of Competing Interest

All authors declare that they have no conflicts of interest.

Acknowledgments

The authors wish to thank the patients who participated in the focus group and the Dutch Veterans Institute for hosting the meeting. We also want to thank the Nypels-Tans PTSD Fund at Leiden University for its financial support.

References

Berman, P., Futoran, K., Lewitus, G.M., Mukha, D., Benami, M., Shlomi, T., Meiri, D., 2018. A new ESI-LC/MS approach for comprehensive metabolic profiling of phytocannabinoids in Cannabis. Sci. Rep. 8 (14), 280.

Black, N., Stockings, E., Campbell, G., Tran, L.T., Zagic, D., Hall, W.D., Farrell, M., Degenhardt, L., 2019. Cannabinoids for the treatment of mental disorders and symptoms of mental disorders: a systematic review and meta-analysis. Lancet Psychiatry 6 (12), 995–1010.

Bonn-Miller, M.O., Boden, M.T., Vujanovic, A.A., Drescher, K.D., 2013. Prospective investigation of the impact of cannabis use disorders on posttraumatic stress disorder symptoms among veterans in residential treatment. Psychol. Trauma Theory Res. Pract. Policy 5, 193–200.

Bonn-Miller, M.O., Vujanovic, A.A., Feldner, M.T., Bernstein, A., Zvolensky, M.J., 2007. Posttraumatic stress symptom severity predicts marijuana use coping motives among traumatic event-exposed marijuana users. J. Trauma. Stress 20, 577–586.

Brown, D., Watson, M., Schloss, J., 2019. Pharmacological evidence of medicinal cannabis in oncology: a systematic review. Support. Care Cancer 27, 3195–3207.

Bryant, R.A., McFarlane, A.C., Silove, D., O'Donnell, M.L., Forbes, D., Creamer, M., 2016. The lingering impact of resolved PTSD on subsequent functioning. Clin. Psychol. Sci. 4, 493–498.

Cameron, C., Watson, D., Robinson, J., 2014. Use of a synthetic cannabinoid in a correctional population for posttraumatic stress disorder-related insomnia and nightmares, chronic pain, harm reduction, and other indications: a retrospective evaluation. J. Clin. Psychopharmacol. 34, 559–564.

Cipriani, A., Williams, T., Nikolakopoulou, A., Salanti, G., Chaimani, A., Ipser, J., Cowen, P.J., Geddes, J.R., Stein, D.J., 2018. Comparative efficacy and acceptability of pharmacological treatments for post-traumatic stress disorder in adults: a network meta-analysis. Psychol. Med. 48, 1975–1984.

Crippa, J.A., Zuardi, A.W., Martín-Santos, R., Bhattacharyya, S., Atakan, Z., McGuire, P., Fusar-Poli, P., 2009. Cannabis and anxiety: a critical review of the evidence. Hum. Psychopharmacol. Clin. Exp. 24, 515–523.

Davis, A.K., Lin, L.A., Ilgen, M.A., Bohnert, K.M., 2018. Recent cannabis use among Veterans in the United States: Results from a national sample. Addict Behav 76, 223–228.

Di Forti, M., Marconi, A., Carra, E., Fraietta, S., Trotta, A., Bonomo, M., Bianconi, F., Gardner-Sood, P., O'Connor, J., Russo, M., Stilo, S.A., Marques, T.R., Mondelli, V., Dazzan, P., Pariante, C., David, A.S., Gaughran, F., Atakan, Z., Iyegbe, C., Powell, J., Morgan, C., Lynskey, M., Murray, R.M., et al., 2015. . Proportion of patients in south London with first-episode psychosis attributable to use of high potency cannabis: a case-control study. Lancet Psychiatry 2, 233–238.

Di Forti, M., Quattrone, D., Freeman, T.P., Tripoli, G., Gayer-Anderson, C., Quigley, H., Rodriguez, V., Jongsma, H.E., Ferraro, L., La Cascia, C., La Barbera, D., Tarricone, I., Berardi, D., Szöke, A., Arango, C., Tortelli, A., Velthorst, E., Bernardo, Miguel, Del-Ben, C.M., et al., 2019. . The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicentre case-control study. Lancet Psychiatry 6, 427–436.

ElSohly, M.A., Mehmedic, Z., Foster, S., Gon, C., Chandra, S., Church, J.C., 2016. Changes in cannabis potency over the Last 2 decades (1995–2014): analysis of current data in the United States. Biol. Psychiatry 79, 613–619.

Englund, A., Morrison, P.D., Nottage, J., Hague, D., Kane, F., Bonaccorso, S., Stone, J.M., Reichenberg, A., Brenneisen, R., Holt, D., Feilding, A., Walker, L., Murray, R.M., Kapur, S., 2013. Cannabidiol inhibits THC-elicited paranoid symptoms and hippocampal-dependent memory impairment. J. Psychopharmacol. 27, 19–27.

Fraser, G.A., 2009. The use of a synthetic cannabinoid in the management of treatment-resistant nightmares in posttraumatic stress disorder (PTSD). CNS Neurosci. Ther. 15, 84–88.

Freeman, A.M., Petrilli, K., Lees, R., Hindocha, C., Mokrysz, C., Curran, H.V., Saunders, R., Freeman, T.P., 2019. How does cannabidiol (CBD) influence the acute effects of delta-9-tetrahydrocannabinol (THC) in humans? A systematic review. Neurosci. Biobehav. Rev 107, 696–712.

Gilpin, N.W., Weiner, J.L., 2017. Neurobiology of comorbid posttraumatic stress disorder and alcohol-use disorder: neurobiology of comorbid PTSD and AUD. Genes Brain Behav. 16, 15–43.

Greer, G.R., Grob, C.S., Halberstadt, A.L., 2014. PTSD symptom reports of patients evaluated for the New Mexico medical cannabis program. J. Psychoactive Drugs 46, 73–77.

Grotenhermen, F., 2003. Pharmacokinetics and pharmacodynamics of cannabinoids. Clin Pharmacokinet 42, 327–360.

Hasin, D.S., Kerridge, B.T., Saha, T.D., Huang, B., Pickering, R., Smith, S.M., Jung, J., Zhang, H., Grant, B.F., 2016. Prevalence and correlates of DSM-5 cannabis use disorder, 2012–2013: findings from the national epidemiologic survey on alcohol and related conditions–III. Am. J. Psychiatry 173, 588–599.

Hill, M.N., Campolongo, P., Yehuda, R., Patel, S., 2018. Integrating endocannabinoid signaling and cannabinoids into the biology and treatment of posttraumatic stress disorder. Neuropsychopharmacology 43, 80–102.

Homish, G.G., Hoopsick, R.A., Heavey, S.C., Homish, D.L., Cornelius, J.R., 2019. Drug use and hazardous drinking are associated with PTSD symptoms and symptom clusters in US Army Reserve/National Guard Soldiers. Am. J. Addict. 28, 22–28.

Jetly, R., Heber, A., Fraser, G., Boisvert, D., 2015. The efficacy of nabilone, a synthetic cannabinoid, in the treatment of PTSD-associated nightmares: a preliminary randomized, double-blind, placebo-controlled cross-over design study. Psychoneuroendocrinology 51, 585–588.

Kessler, R.C., 2000. Posttraumatic stress disorder: the burden to the individual and to society. J Clin Psychiatry 61, 4–14.

Krcevski-Skvarc, N., Wells, C., Häuser, W., 2018. Availability and approval of cannabis-based medicines for chronic pain management and palliative/supportive care in Europe: a survey of the status in the chapters of the European Pain Federation. Eur. J. Pain 22, 440–454.

Krystal, J.H., Davis, L.L., Neylan, T.C., A. Raskind, M., Schnurr, P.P., Stein, M.B., Vessicchio, J., Shiner, B., Gleason, T.D., Huang, G.D., 2017. It is time to address the crisis in the pharmacotherapy of posttraumatic stress disorder: a consensus statement of the PTSD Psychopharmacology working group. Biol. Psychiatry 82, e51–e59.

Lee, D.J., Schnitzlein, C.W., Wolf, J.P., Vythilingam, M., Rasmusson, A.M., Hoge, C.W., 2016. Psychotherapy versus pharmacotherapy for posttraumatic stress disorder: systemic review and meta-analyses to determine first-line treatments. Depress. Anxiety 33, 792–806.

Lyk-Jensen, S.V., Weatherall, C.D., Jepsen, P.W., 2016. The effect of military deployment on mental health. Econ. Hum. Biol. 23, 193–208.

Martin-Santos, R., A. Crippa, J., Batalla, A., Bhattacharyya, S., Atakan, Z., Borgwardt, S., Allen, P., Seal, M., Langohr, K., Farre, M., Zuardi, Aw., K. McGuire, P., 2012. Acute Effects of a Single, Oral dose of d9-tetrahydrocannabinol (THC) and Cannabidiol (CBD) Administration in Healthy Volunteers. Curr. Pharm. Des. 18, 4966–4979.

Ney, L., Matthews, A., Bruno, R., Felmingham, K., 2019. Cannabinoid interventions for PTSD: where to next? 93, 124–140.

Nappi, C.M., Drummond, S.P.A., Hall, J.M.H., 2012. Treating nightmares and insomnia in posttraumatic stress disorder: A review of current evidence. Neuropharmacology 62, 576–585.

Passie, T., Emrich, H.M., Karst, M., Brandt, S.D., Halpern, J.H., 2012. Mitigation of post-traumatic stress symptoms by Cannabis resin: a review of the clinical and neurobiological evidence. Drug Test. Anal. 4, 649–659.

Ranganathan, M., D'Souza, D.C., 2006. The acute effects of cannabinoids on memory in humans: a review. Psychopharmacology (Berl.) 188, 425–444.

Reznik, I., 2012. Post-traumatic stress disorder and medical cannabis use: a naturalistic observational study. Eur. Neuropsychopharmacol. 22, S63–S64.

Roitman, P., Mechoulam, R., Cooper-Kazaz, R., Shalev, A., 2014. Preliminary, open-label, pilot study of add-on oral Δ9-tetrahydrocannabinol in chronic post-traumatic stress disorder. Clin. Drug Investig. 34, 587–591.

Shalev, A., Liberzon, I., Marmar, C., 2017. Post-traumatic stress disorder. N. Engl. J. Med. 376, 2459–2469.

Steenkamp, M.M., Blessing, E.M., Galatzer-Levy, I.R., Hollahan, L.C., Anderson, W.T., 2017. Marijuana and other cannabinoids as a treatment for posttraumatic stress disorder: a literature review: Steenkamp et al. Depress. Anxiety 34, 207–216.

Steenkamp, M.M., Litz, B.T., Hoge, C.W., Marmar, C.R., 2015. Psychotherapy for military-related PTSD: a review of randomized clinical trials. JAMA 314, 489–500.

Vermetten, E., Baker, D.G., Risbrough, V.B., 2018. Behavioral Neurobiology of PTSD, 1st ed. New York, NY: Springer, Berlin Heidelberg.

Vrijens, B., De Geest, S., Hughes, D.A., Przemyslaw, K., Demonceau, J., Ruppar, T., Dobbels, F., Fargher, E., Morrison, V., Lewek, P., Matyjaszczyk, M., Mshelia, C., Clyne, W., Aronson, J.K., Urquhart, J., 2012. A new taxonomy for describing and defining adherence to medications: New taxonomy for adherence to medications. Br. J. Clin. Pharmacol. 73, 691–705.

Wilkinson, S.T., Stefanovics, E., Rosenheck, R.A., 2015. Marijuana use is associated with worse outcomes in symptom severity and violent behavior in patients with posttraumatic stress disorder. J. Clin. Psychiatry 1174–1180.

Xue, C., Ge, Y., Tang, B., Liu, Y., Kang, P., Wang, M., Zhang, L., 2015. A meta-analysis of risk factors for combat-related PTSD among military personnel and veterans. PLOS ONE 10, e0120270.

Yehuda, R., Hoge, C.W., McFarlane, A.C., Vermetten, E., Lanius, R.A., Nievergelt, C.M., Hobfoll, S.E., Koenen, K.C., Neylan, T.C., Hyman, S.E., 2015. Post-traumatic stress disorder. Nat. Rev. Dis. Primer 15, 057.