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Attitudes toward and knowledge of medical cannabis among individuals with spinal cord injury

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Abstract

Study design An observational study based on an online survey addressing attitudes toward and knowledge of cannabis among people living with spinal cord injury (SCI).

Objectives To characterize attitudes toward and knowledge of cannabis among a nationwide sample ($n = 353$) of people with SCI. To determine if knowledge and attitudes are influenced by socio-demographic and injury-specific factors.

Setting Three academic medical centers in the US.

Methods Distribution of an online survey through email lists maintained by 3 SCI centers.

Results Participants largely believed that cannabis use is safe, has potential therapeutic benefits, and ought to be legal. Substantial pluralities felt that cannabis use is attended by moderate to great health-related and social risks (15.5% and 25.5%, respectively), and a majority (55.9%) felt it is attended by moderate to great legal risks. Subjects' duration of injury, employment status, and personal history of controlled or illicit substances influenced certain beliefs and attitudes.

Conclusions This study is the first to assess beliefs about and attitudes toward cannabis use among a nationwide sample of people with SCI. While limited, it provides a roadmap for future research. It also offers medical providers an initial understanding of which factors may encourage or dissuade their patients with SCI from seeking medical cannabis treatment.

Introduction

Between 8.3% and 13.2% of Americans use cannabis on at least a yearly basis [1–3], though rates of use decrease with age [4, 5]. Although vast majorities of Americans believe that cannabis use carries potential risks including legal problems, substance abuse, impaired memory, and relationship difficulties [6], attitudes toward cannabis are becoming more permissive. Schmidt et al. found that young adults increasingly believe that weekly or monthly cannabis use does not pose significant risks [7]. Keyhani et al. reported that 81% of adults believe that cannabis use has at least one benefit [6].

Scant data suggest that some individuals with spinal cord injury (SCI) use cannabis to alleviate pain, spasticity,

anxiety, and sleeplessness [8]. However, virtually nothing is known about their attitudes toward and knowledge of cannabis. We recently distributed an online survey to adults living with SCI examining their perceptions and knowledge of cannabis. In this paper, we sought to characterize a nationwide cohort's feelings about cannabis use and to determine which, if any, demographic or injury-specific traits influenced them. In attempting to describe prevailing attitudes toward cannabis among people living with SCI, we hoped to help clinicians understand how their patients' beliefs that may either encourage or dissuade use of a potentially useful and increasingly legal medication.

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Methods

Survey development

The authors reviewed existing surveys and manuscripts addressing a variety of aspects of cannabis use [2, 9, 10] and then interviewed experts in the field of medical cannabis and spinal cord medicine. Using that foundation, we drafted an online survey addressing participants' demographic and injury-specific data, their knowledge of and attitudes toward cannabis, and various aspects of their personal and family use of cannabis and other controlled or illicit substances. We solicited feedback on the survey's content and usability from Thomas Jefferson University's SCI Consumer Ethics Advisory Board and then submitted the instrument for IRB approval. For the purposes of the survey, "medical cannabis" was defined as cannabis used to treat a medical condition or symptom, regardless of how it was obtained or who had recommended it.

No identifying details were collected. Consent was implied by participants' completing the survey.

Survey distribution

The survey was distributed to SCI consumer email lists maintained by Thomas Jefferson University, University of Washington at Seattle, and University of Alabama at Birmingham. This effort yielded 246 responses. A second "reminder" email was sent 4 weeks after the first and yielded an additional 107 responses for a total n of 353.

Data analysis

Survey responses were reviewed for completeness and for out of range responses. The data were analyzed using individual Chi-square or t -tests for continuous data. Distribution-free exact statistics were used if expected values in categories fell below 5 in any cell. For purposes of analysis, free text responses were occasionally grouped. For instance, in determining whether subjects' age influenced their responses, we separated them into categories of older or younger than the median age.

Results

A total of 353 people from 39 states responded to the survey, though some left questions and sections blank. Subjects' median age was 55 years, their median age at the time of injury was 31 years, and their median duration of injury (DOI) was 14 years. The majority of participants were male (62.5% male vs 36.5% female and 1% transgender), not currently employed (62.8% vs 37.2% employed), and held a

college or advanced degree (60.2% vs 28.6% "some college" and 11.3% high school graduate or less). Most participants (85.1%) identified trauma (sports, assault, motor vehicle crash, fall, or birth injury) as the etiology of their SCI, 52% characterized their SCI as cervical (35.7% thoracic and 12.2% lumbar), 30.2% reported that their SCIs were motor complete (53.6% were unable to answer the question), and 95.9% required no ventilatory assistance. Nearly all subjects (96.3%) lived in a private residence and their home communities represented a variety of setting (rural/small town 25.8%, suburban 31.8%, and urban 42.5%).

To assess subjects' reports of pain, health, and quality of life (QOL), we utilized a 10-point Likert scale and grouped numerical answers for analysis. For pain, responses between 0 and 3, 4 and 6, and 7 and 10, respectively, were interpreted as low, moderate, and extreme interference with activities of daily living, mood, and sleep. For questions about health and QOL, responses between 0 and 3, 4 and 6, and 7 and 10, respectively, indicated dissatisfaction, relative neutrality ("neither satisfied nor dissatisfied"), and overall satisfaction. Respondents' assessments of pain's interference with their daily activities and impact on their overall mood were nearly evenly split between the three categories. There was also a near-equal distribution of subjects reporting being "completely satisfied," "neither satisfied nor unsatisfied," or "completely dissatisfied" with their recent physical and emotional health.

Study participants had relatively liberal attitudes toward cannabis use (Table 1). They overwhelmingly believed that cannabis should be legalized (91.0%) and could have medicinal effects (96.0%), that cannabis smokers are not prone to violence (96.6%), that cannabis is not a gateway drug (81.3%), and that cannabis neither carries a high risk of overdose (96.0%) nor is a very dangerous drug (94.3%). Virtually all subjects (98.9%) believed that medical cannabis should be made available to people with qualifying conditions.

While few respondents thought that cannabis is more addictive than tobacco (4.0%), alcohol (6.1%), cocaine (0.9%), or opiates (2.0%), higher percentages felt that it is more addictive than caffeine (10.7%) and chocolate (29.9%). In evaluating subjects' perceptions of risks associated with cannabis use, we grouped four possible responses (no, slight, moderate, or great risk) into two groups (no/slight risk and moderate/great risk). While relatively few participants felt that cannabis use is attended by moderate/great health-related (15.5%) or social (25.5%) risks, substantially more (55.9%) felt that it carries moderate/great legal risks (Table 2).

Depending on the difficulty of each question in the "Knowledge" section, participants were either exceedingly likely or overwhelming unlikely to answer it correctly

Table 1 Attitudes toward cannabis

Attitudes	Agree	Disagree
Cannabis should be legalized.	(314, 91.0%)	(31, 9.0%)
Cannabis smokers are prone to violence.	(12, 3.4%)	(339, 96.6%)
Withdrawal from cannabis can be life-threatening.	(13, 3.7%)	(337, 96.3%)
Cannabis is a gateway drug.	(65, 18.7%)	(283, 81.3%)
Cannabis use has a high risk of overdose.	(14, 4.0%)	(335, 96.0%)
Cannabis is a very dangerous drug.	(20, 5.7%)	(330, 94.3%)
It is possible that cannabis could have medicinal effects.	(336, 96.0%)	(14, 4.0%)
It is safer to take prescription painkillers than to use cannabis.	(35, 10.1%)	(311, 89.9%)
I believe that medical cannabis should be made available to people with qualifying conditions.	(346, 98.9%)	(4, 1.1%)

Table 2 Perceptions of risk of cannabis use

Perception of risk	No risk/slight risk	Moderate risk/great risk
Perceived legal risk	(152, 44.1%)	(193, 55.9%)
Perceived social risk	(256, 74.4%)	(88, 25.6%)
Perceived health risk	(291, 84.6%)	(53, 15.4%)

(Table 3). While 91.1% knew that cannabis smokers are not prone to violence, 65.0% falsely believed that cannabis intoxication causes impairment in learning simple tasks, and virtually none (1.3%) knew that it is not a highly effective treatment for glaucoma.

In seeking correlations between demographic and injury-specific characteristics and attitudes toward and knowledge of cannabis, sporadic associations emerged. For instance, respondents over the age of 55 were more likely than those under the age of 55 to believe that it is safer to take prescription painkillers than it is to take cannabis (12.2% vs 5.3%; $\chi^2 = 4.88$, $p = 0.34$). Subjects who reported past use of intravenous drugs were more likely than those who did not to believe that crime increased in Colorado after cannabis was legalized (68.6% vs 48.9%; $\chi^2 = 4.80$, $p = 0.28$). However, only three demographic and injury-specific factors influenced more than one survey response.

First, participants who had lived with SCI for more than 14 years were more likely that those with shorter DOI to believe that cannabis use is attended by moderate or great health risks (22.5% vs 12.2%; $\chi^2 = 5.47$, $p = 0.19$), that cannabis is a very dangerous drug (9.0% vs 2.7%; $\chi^2 = 5.32$, $p = 0.21$), and that cannabis ought not to be legalized (13.9% vs 4.8%; $\chi^2 = 7.00$, $p = 0.008$). Second, employed subjects were more likely than those who did not work to believe that cannabis is a very dangerous drug (10.1% vs 3.8%; $\chi^2 = 4.69$, $p = 0.030$), and substantially more likely than retired subjects to believe that cannabis use carries moderate or great legal risks (61.8% vs 48%; $\chi^2 = 5.53$, $p = 0.19$). Third, the subjects' history of drug use influenced both their knowledge of and attitudes toward cannabis use. Participants who reported never having used a controlled or

illicit substance were less likely than those who had to identify 9-THC as the chemical in cannabis that causes users to feel "high" (81.3% vs 91.3%; $\chi^2 = 6.80$, $p = 0.009$) and to know that smoking is the means of administration that creates the fastest effects (54.7% vs 78.2%; $\chi^2 = 19.50$, $p < 0.001$). They were also more likely to incorrectly believe that cannabis intoxication causes impairment in simple learning tasks (74.1% vs 57.2%; $\chi^2 = 9.61$, $p = 0.002$) and cannabis smokers are prone to violence (14.4% vs 4.7%; $\chi^2 = 8.90$, $p = 0.003$). Respondents who had never used controlled or illicit substances were less likely than current or former users to believe that cannabis should be legalized (88.1% vs 98.0%; $\chi^2 = 10.92$, $p = 0.001$) and more likely to believe that cannabis is a very dangerous drug (7.0% vs 1.3%; $\chi^2 = 5.90$, $p = 0.015$) that is less safe to use than prescription medications (11.8% vs 4.0%; $\chi^2 = 5.91$, $p = 0.015$).

Discussion

While other authors have examined the American public's attitudes toward cannabis, this is the first paper to query attitudes toward and knowledge of cannabis among people living with SCI. A number of findings are notable.

First, our nationwide sample of subjects with SCI overwhelmingly believed that cannabis ought to be legal, that it is safe for use, and that it likely has medicinal effects. A recent Pew Research Center survey ($n = 1754$) found that only 62% of Americans (compared with 91% in this study) favor legalizing cannabis [11], and Keyhani et al. determined that 81% of Americans (compared with 96% in this study) feel that cannabis use has at least one benefit [6]. It is possible that our survey respondents were selected for their interest in the subject of cannabis, and were, hence, more likely to support its legalization. It is also possible that due to the high incidence of pain and spasticity in chronic SCI [12–18], people living with injuries may be more open to non-traditional therapies. Future studies recruiting

Table 3 Knowledge of cannabis

Questions	Correct answer	Correct	Incorrect
The chemical in cannabis that causes the user to feel “high” is called _____.	9-THC	(273, 86.9%)	(41, 13.1%)
^a Cannabis users experience short-term memory loss because of the drug’s effect on the _____.	Hippocampus	(128, 40.8%)	(186, 59.2%)
Cannabis intoxication causes impairment in learning simple tasks.	False	(110, 35.0%)	(204, 65.0%)
Cannabis smokers are prone to violence.	False	(285, 91.1%)	(28, 8.9%)
Research shows that medical cannabis is effective in reducing pain.	True	(277, 88.2%)	(37, 11.8%)
^a Cannabis is a highly effective treatment for glaucoma.	False	(4, 1.3%)	(310, 98.7%)
Cannabis can help patients with cancer increase their body weight.	True	(225, 71.7%)	(89, 28.3%)
Crime increased in Colorado after cannabis was legalized.	False	(160, 50.8%)	(155, 49.2%)
The FDA-approved drug Dronabinol (Marinol) is actually synthetic THC.	True	(96, 30.5%)	(219, 69.5%)
Which of the following is true? (Cannabis leads to cancer, Cannabis decreases immune system function, Cannabis eases nausea, I don’t know)	Cannabis eases nausea	(258, 82.4%)	(55, 17.6%)
Which method of ingesting cannabis creates the fastest effects?	Smoking	(212, 67.3%)	(103, 32.7%)
^a Cannabis has been shown to cause psychosis in _____.	New users	(41, 13.1%)	(271, 86.9%)
^a Theoretically, it is possible for a human to overdose on cannabis. In order to do so, a person would have to smoke _____.	1500 lbs in 15 min	(30, 9.6%)	(284, 90.4%)
^a A 2016 Pew Foundation poll found that which percent of Americans were in favor of legalizing cannabis for recreational use?	60%	(66, 21.1%)	(247, 78.9%)

^aItem was deemed difficult by authors

consecutive subjects with SCI may offer more accurate assessments of their knowledge of and attitudes toward cannabis.

Second, we were surprised that DOI influenced subjects’ support for the legalization of cannabis. It could be that DOI is a surrogate for age (i.e., that people with longer standing injuries are older than those with more recent ones), yet subjects’ age did not affect their answers. It is possible that this was an erroneous finding, and that even though the association was significant it is not actually true. Historical data suggest that neither severity of pain nor pain interference with work decrease over the course of SCI [19], so it is unlikely that those with longer standing injuries would have less of an interest in exploring non-pharmacologic approaches to pain and spasticity than would those with more recent injuries.

Third, it seems that people living with SCI are well aware of the potential risks of cannabis use. Sizable pluralities of Americans over the age of 26 believe there are “great risks” associated with weekly or monthly cannabis use (39.6% and 29.2%, respectively) [3], and between 15.5% and 55.9% of our subjects associated cannabis use with moderate or great risks. It is noteworthy, however, that employment status was the only demographic or injury-specific factor to correlate with perception of legal risk.

Just over half (51.8%) of adult Americans believe that cannabis may be attended by legal problems, but only 20.7% believe that to be cannabis’ primary risk [6]. In our study, though, nearly two-thirds (61.8%) of working subjects rated the legal risks of cannabis use as moderate or

great, and that may reflect their awareness of the fundamentally tenuous nature of their livelihood. Depending on DOI, between 12.40% and 25.9% of individuals with SCI are employed [19], and their ability to return to work after SCI may be hampered by their severity of injury, their ethnicity, their access of external supports, and their level of education [20]. It is possible—though we did not specifically ask this question—that employed people with SCI know that cannabis use may threaten their financial security, and they may, hence, be more reluctant than non-employed individuals to seek or agree to cannabis therapy.

Limitations

This study has several important limitations. First, our distribution method introduced bias. By recruiting individuals with SCI who had received care at academic centers and remained in contact with their research staff, we limited outreach to people with robust technological access and, likely, with substantial financial and educational resources. Further, while we did not inquire about annual family income, over 60% of our participants had college or advanced degrees, and depending on DOI, between 10.90% and 43.70% of individuals with SCI have completed college [19]. It is possible that people who have completed more school have different attitudes toward and deeper knowledge of cannabis, though we were unable to find literature to support this. Finally, after initial distribution by our partnering academic centers, the link to this survey “leaked” onto a variety of blogs and email lists. It is, hence,

impossible for us to estimate response rate or to adequately grasp how selection bias influenced our results. We imagine that only people with specific interests in medical cannabis completed this survey. This being said, this is the first paper to demonstrate that there is both strong support among people with SCI for the legalization of cannabis, and healthy awareness of its legal risks.

Conclusions

Although limited, this is the first paper to evaluate attitudes toward and knowledge of cannabis among a nationwide sample of individuals with SCI. The insights gleaned from this survey may help clinicians understand which factors may motivate or dissuade their patients from exploring cannabis as a therapeutic option. It also provides the basis for further and more specific research into emerging attitudes toward cannabis among people living with injuries.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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