

Evaluation of Deep Sedation Outcomes with respect to Cannabis Use

Kim J, Torsney A, Votta T, Heard J, Malinovsky J, Heard C

State University of New York University at Buffalo, Department of Pediatric and Community Dentistry

Introduction

With the legalization of cannabis use, both medically and legally, in New York state, we have noted that there appears to be an increase in the reported use of cannabis in our oral surgery patient population. This can have deleterious effects on the effectiveness and safety of procedural sedation.

The aim of this study was to utilize a cannabis use questionnaire to determine cannabis consumption of our patients and match the cannabis use patterns with sedation outcomes in young adults for third molar extractions under propofol based deep sedation.

Methods

After IRB approval and with informed consent, adult patients, completed a 5-minute cannabis use questionnaire prior to sedation administration. The cannabis use questionnaire was based on a previously published (Figure 1) cannabis use tool that was slightly modified resulting in a 28-question assessment.

The patients were categorized into 7 cannabis user groups based on the reported answers in the questionnaire (Table 1). For analysis, the 7 user groups were sorted into 4 USER categories: non-USER (USER group 0), light-USER (USER groups 1-2), moderate-USER (USER groups 3-4), and heavy-USER (USER groups 5-6). The patient demographics, medical history, sedation use, and outcomes were obtained from the sedation records. Our weight based dosing algorithm was used for the sedation.

TABLE 1	DESCRIPTION
USERS 0	Never Used
USERS 1	Score < 20 / Not for a year
USERS 2	Score 21-30 / Not for 6 months
USERS 3	Score 31 to 60
USERS 4	Score 61 to 90
USERS 5	Score 91 to 120
USERS 6	Score 120+

Figure 1. <https://doi.org/10.1371/journal.pone.0178194>

Measuring cannabis consumption: Psychometric properties of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU)

Carrie Cuttler*, Alexander Spradlin
Department of Psychology, Washington State University, Pullman, WA, United States of America
*carrie.cuttler@wsu.edu

Abstract

Objective
We created the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU) because the current lack of psychometrically sound inventories for measuring these dimensions of cannabis use has impeded research on the effects of cannabis in humans.

Results

We have recruited 46 patients so far. Overall and USER category demographics and medical history are shown in Tables 2 and 3 respectively. Overall, the average age was 19.4 years old, average weight was 71.2 kg, and average BMI was 24.2 with no significant differences across the USER categories. There was a significant difference in the gender between our non-USER and heavy-USER categories with a significantly higher percentage of female patients in the non-USER category when compared to the heavy-USER category. There was an expected significant difference in the percentage of patients who reported cannabis use during the pre-

TABLE 2	AGE (years)	WEIGHT (kg)	BMI
OVERALL (average)	19.4	71.2	24.2
OVERALL (SD)	1.5	13.1	4.5
USERS 0 (average)	18.8	70.0	25.4
USERS 1-2 (average)	19.1	66.4	22.7
USERS 3-4 (average)	20.1	69.6	23.8
USERS 5-6 (average)	19.7	77.3	24.6
p value ANOVA	0.163	0.214	0.563

TABLE 3	No. of PATIENTS	% FEMALE	% USE PREOP	% ETOH	% PSYCH MEDS
OVERALL	46	58.7	60.9	32.6	21.7
USERS 0	12	83.3	0.0	8.3	8.3
USERS 1-2	10	60.0	0.0	30.0	20.0
USERS 3-4	11	72.7	54.5	36.4	36.4
USERS 5-6	13	23.1	92.3	53.8	23.1
p value χ^2		0.013	0.000	0.112	0.443
Post Hoc Residuals		Users 0 and Users 5-6	Users 0, 1-2, and 5-6		

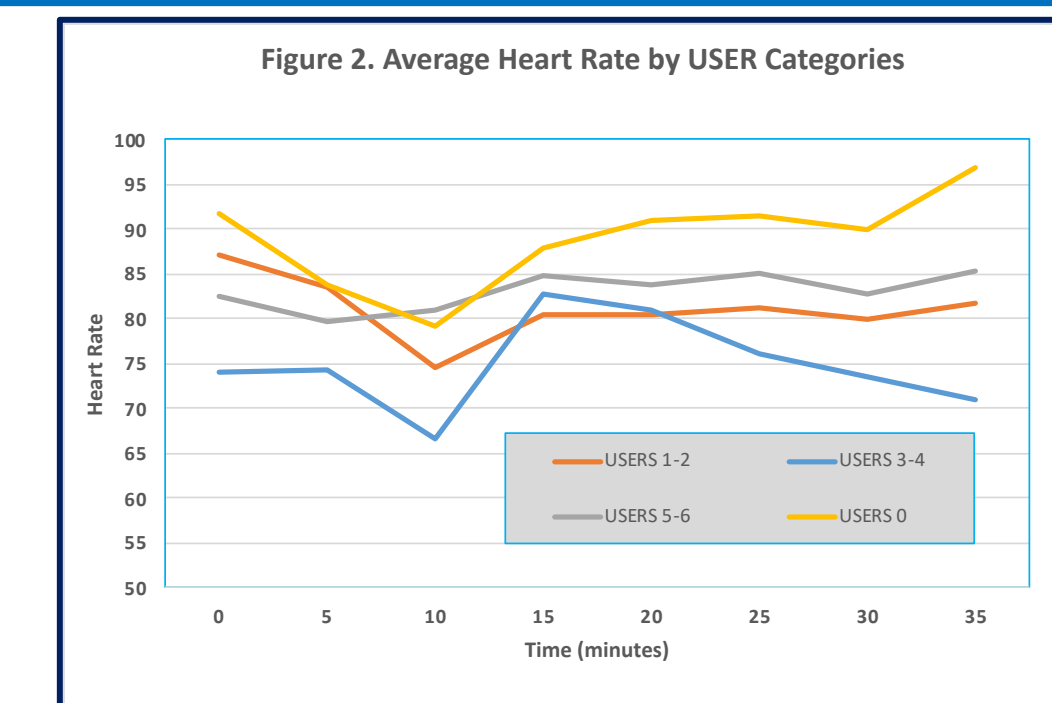
sedation evaluation between the non-USER and light-USER categories when compared to our heavy-USER category. Interestingly, about 50% of the patients who acknowledged cannabis use on the study questionnaire, denied use during the pre-sedation medical evaluation.

Sedation outcome metrics and procedure times are shown in Table 4. There was no significant difference between the USER categories with respect to airway score, behavior score, sedation time, procedure time and recovery time.

TABLE 4	SEDATION TIME	PROCEDURE TIME	PACU TIME	AIRWAY SCORE	BEHAVIOR SCORE
OVERALL (average)	8.1	17.2	31.2	5.9	10
OVERALL (SD)	1.7	6.5	8.3	0.4	7
USERS 0 (average)	8.0	19.3	31.3	5.8	9.8
USERS 1-2 (average)	8.1	18.5	33.4	5.8	9.5
USERS 3-4 (average)	7.5	13.8	29.7	5.9	9.5
USERS 5-6 (average)	8.6	17.2	30.6	5.9	9.1
p value ANOVA	0.483	0.202	0.786	0.872	0.176

Overall and USER category sedation dosing data are shown in Table 5. The total midazolam and fentanyl dose required for sedation was significantly higher in the heavy-USER category compared to the non-USER and light-USER categories. The number of midazolam doses required was significantly higher in the heavy-USER category compared to the non-USER category. The number of fentanyl doses required was significantly higher in the heavy-USER category compared to the non-USER and light-USER categories. The propofol dose, rate and algorithm curve were

TABLE 5	MID TOTAL (MG)	NO. MID DOSES	FENT TOTAL (MCG)	NO. FENT DOSES	PROP DOSE (MG)	PROP DUR (MINS)	PROP RATE (MCG/KG/MIN)	PROP CURVE (rate)
OVERALL (average)	5.4	2.8	113.0	3.2	175.1	20.3	136.0	25.5
OVERALL (SD)	2.0	1.0	34.4	0.7	53.6	5.9	50.8	47.4
USERS 0 (average)	4.6	2.3	100.0	3.0	162.1	22.1	115.7	8.1
USERS 1-2 (average)	4.8	2.6	100.0	3.0	171.0	22.0	128.8	19.9
USERS 3-4 (average)	5.2	2.7	109.1	3.1	158.2	17.4	156.3	41.3
USERS 5-6 (average)	6.9	3.5	138.5	3.7	204.6	20.0	143.3	32.7
PROP CURVE, AVERAGE RATE +/- THE EXPECTED AVERAGE DOSE USING OUR DOSING ALGORITHM								
p value ANOVA	0.007	0.017	0.010	0.019	0.113	0.182	0.241	0.255
Tukey Post Hoc Groups differences	Users 0, 1-2, and 5-6	Users 0 and Users 5-6	Users 0, 1-2, and 5-6	Users 0, 1-2, and 5-6	Users 0, 1-2, and 5-6			TRENDS FOR HIGHER DOSE PROP WITH INCREASE SCORE



trending upwards for higher cannabis use score patients but failed to reach significance at this point in our data collection. The average heart rate during the procedure for the USER categories is shown in Figure 2. ANOVA analysis confirmed there were no differences between the

USER categories except at T = 35 mins during the recovery period, (p=0.002), where the non-USER category had a significantly higher average heart rate when compared to heavy-USER category. There was no difference between the USER categories with respect to oxygen saturation (average 99%) or the procedure sedation RASS scores (median 4). The peri-operative use of glycopyrrolate was significantly higher (p=0.0001) between heavy-USER (92%) and the other USER categories. However, our routinely used adjuncts: ketorolac, dexamethasone and ondansetron were not significantly different across the USER categories.

Discussion

Interestingly, the majority of our deep sedation adult patients have reported recent use of cannabis in the questionnaire even if denied on the pre-sedation medical evaluation.

Patients who are heavy users of cannabis have a higher total midazolam and fentanyl dose requirements than those who are light or non-users. The number of midazolam and fentanyl doses required during the sedation procedure were significantly higher in the heavy user patients when compared to the non-users for midazolam and when compared to both light and non-users for fentanyl, consistent with additional dosing requirements. The propofol dose requirements also displayed a trend towards higher doses for heavier cannabis users, though results failed to reach statistical significance.

The anesthesiologist was blinded to the questionnaire results. The sedation dosing was as required clinically, which usually involved additional midazolam dosing and/or higher propofol infusion rates or boluses. Of note, glycopyrrolate was mostly given to those patients who acknowledged cannabis use on the pre-sedation evaluation, as per our protocol.

Sedation outcome metrics including airway score, behavior score, procedure and recovery times all showed no significant difference across all cannabis USER categories, demonstrating effective sedation despite differences in sedation dose requirements. However, this study is still early in the planned data collection.

References

- Carrie Cuttler, Alexander Spradlin. Measuring cannabis consumption: Psychometric properties of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). <https://doi.org/10.1371/journal.pone.0178194>.
- Marcelle Hernandez, David J. Birnbach and Andre' A.J. Van Zundert. Anesthetic management of the illicit substance using patient. *Current Opinion Anaesthesiology*, 18:315-324. 2005.
- Ethan O. Bryson, MD Elizabeth A.M. Frost, MD The Perioperative Implications of Tobacco, Marijuana, and Other Inhaled Toxins. *International Anesthesiology Clinics*, 49:103-118. 2011.
- A. Rudra, Anjan Bhattacharya, S Chatterjee, S Sengupta, T Das. Anaesthetic Implications of Substance Abuse in Adolescents. *Indian Journal of Anaesthesia*, 52:132-139. 2009.
- Huu Nguyen. Cannabis (marijuana) and anesthesia. *Anesthesiology Rounds*, 3:9. 2004.
- Lindsey A. Hines, Freeman, Suzanne H. Gage, Stanley Zammit, et al. Association of High-Potency Cannabis Use With Mental Health and Substance Use in Adolescence. *JAMA Psychiatry*. 2020;77(10):1044-1051.
- Nicholas Mechas, Paul Deltrick, Allen Fielding. Effects Of Cannabis Use On Patients Undergoing Office-Based Anesthesia: A Brief Literature Review And Case Report of 50 Outpatient Cases Of IV Sedation in Marijuana Users. *Oral surgery, oral medicine, oral pathology and oral radiology*, 2018-11, Vol.126 (5), p.e241-e242.