Contemporary Routes of Cannabis Consumption: A Primer for Clinicians

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Although cannabis use is federally prohibited, medical cannabis is legal in some form in 30 states and the District of Columbia, and recreational use is legal in 8 states and the District of Columbia. The increasing legal acceptance of cannabis has led to a burgeoning industry that is producing an expanding variety of cannabis products. Physicians and other health care professionals should be aware of modern forms of cannabis consumption, as well as variations in tetrahydrocannabinol concentrations, to improve assessment of cannabis use and approach to treatment. This review aims to familiarize clinicians with modern forms of cannabis consumption and enable comparisons between disparate cannabis products.

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Cannabis is one of the most widely used and controversial substances worldwide.[1] In the United States, cannabis use is federally prohibited; however, 30 states and the District of Columbia have legalized some form of medical cannabis, and 8 states and the District of Columbia have legalized recreational cannabis for adults.[2] With this shift toward legalization of cannabis, a burgeoning multibillion dollar cannabis industry has emerged, producing high-potency herbal cannabis, mass-produced cannabis edibles, and cannabis oils, concentrates, and topical preparations. In addition to access to more forms of cannabis, users are now able to select products based on the tetrahydrocannabinol (THC) and cannabidiol (CBD) concentration. Considering these changes, it is important that physicians and other health care providers understand the most common types of cannabis products, how they compare to each other, and how to estimate cannabis use from information provided by patients. We review common cannabis products being used today, different routes of consumption, how to assess dosage of THC from basic information provided by patients, and considerations for counseling patients during clinical encounters.

Basics of THC and CBD

The main pharmacologically active chemicals in cannabis are the cannabinoids THC and CBD. Tetrahydrocannabinol works by binding to and activating the CB1 and CB2 receptors.[3] Less is known about the pharmacologic mechanism of CBD, but it has been theorized that it may work as an inverse agonist at the CB1 or CB2 receptors.[4] Tetrahydrocannabinol has been shown to induce transient symptoms of psychosis among healthy volunteers and is thought to be a risk factor in developing psychosis; conversely, CBD is theorized to have antipsychotic and anxiolytic properties.[5] Regarding medical utility, there is moderate-quality evidence that THC may help chronic neuropathic or cancer pain and that THC and CBD may benefit patients who have spasticity owing to multiple sclerosis.[6] In addition, low-quality evidence suggests that cannabinoids may help nausea and vomiting secondary to chemotherapy.[6] Currently, CBD is being studied for its possible antiseizure and anti-inflammatory properties.[7]

In theory, the amount of THC or CBD being consumed would modulate its potential effects. Greater CBD consumption would theoretically provide more health benefits (such as improvement

in anxiety), without the psychoactive properties (such as euphoria) that accompany THC use. It is important for clinicians to be aware of the levels of THC and CBD consumed so that they can compare dose and exposure for possible effects. For example, a 500-mg sample of an herbal product that is 20% THC by weight has roughly 100 mg of THC in it. Given that some THC is lost to combustion, side stream, and exhalation, a person smoking 500 mg of this sample would inhale a dose of THC somewhere between 25 and 35 mg. By contrast, if someone was to smoke 500 mg of a concentrated cannabis extract that is 70% THC by weight, he or she would be exposed to between 87.5 and 122.5 mg of THC. This difference in THC dose is significant, despite smoking the same amount of product.

Routes of Cannabis Use

Inhaled Cannabis

Historically, the most common way to use cannabis has been smoking herbal cannabis (or *marijuana, pot*, or *weed*).[1,8,9] Users typically smoke the dried mature cannabis flower and adjacent leaves. Intoxication by this route occurs as soon as 2 minutes after the first inhalation, and peak drug effect occurs about 30 minutes after use, regardless of what type of cannabis product is used.[8] Users typically remain intoxicated for 2 to 4 hours after use, but some minor effects, such as impaired working memory, can persist for longer than 24 hours.[8]

Patients will often refer to the number of "bowls" that they smoke, which refers to 1 filling of the chamber of a pipe. Recreational cannabis users often refer to slang terms such as *joints*, *blunts*, and *spliffs*. A joint is a cigarette of cannabis, a blunt is a cannabis cigar, and a spliff can refer to cannabis mixed with tobacco, though some people use this term to describe a cone-shaped joint with a filter. Because amounts of cannabis in these forms of consumption are not standardized, it can be difficult to accurately calculate the amount of cannabis smoked. A more accurate estimate of quantity used can be made by gathering data regarding how often and how much they typically purchase, how many bowls they smoke per ingestion, and how many times they use cannabis before they purchase again. Importantly, the total amount of cannabinoids present in herbal cannabis is not equal to the amount that is ingested. As demonstrated by Zuurman et al,[10] when smoking, users typically absorb about 25% of the cannabinoids present in herbal cannabis.

The strength of cannabis has been increasing over the past half century.[8] During the 1960s, cannabis was typically about 1% to 5% THC by weight.[1] In the 1970s, cannabis growers began selectively breeding high-THC content cannabis, reaching strengths of around 15% THC.[1] Many strains available today range from 15% to 25% THC by weight, with some strains reaching 30% or higher.[8]

An increasingly common way to use herbal cannabis is with an herbal vaporizer.[3] Dosage can be calculated the same way as smoked cannabis, but users will describe the number of times they put fresh cannabis in their vaporizer rather than the number of bowls. Vaporizing, or *vaping*, is a more efficient way of using herbal cannabis compared with smoking. When inhaling cannabis via a vaporizer, the user absorbs up to 33% of the total cannabinoids present in herbal cannabis.[9]

Hashish, a crude product consisting of the compacted sticky resin glands of the cannabis plant, is likely one of the first ways cannabis was used for its psychedelic effect.[1] Historically, hashish ranged from 15% to 30% THC by weight.[1] Currently, it is less likely to be used because of the availability of highly concentrated, relatively pure THC cannabis extracts, known colloquially as *dab*, *wax*, or *butane honey oil*.[11] These products are produced using simple fractional chemistry. Producers separate and concentrate the highly lipophilic cannabinoids present in herbal cannabis to make a product that can be nearly pure THC. As these products are often smoked or vaporized, the same method for calculating THC dose from an herbal product can be used to estimate THC dose. Because of the high concentration of cannabinoids present in these concentrated products, a very small amount is needed to feel an effect. Users may intake a significantly higher dose of THC when

using concentrates relative to herbal cannabis.[11] For example, if a person smokes 250 mg of 10% THC by weight cannabis, he or she is ingesting roughly 6.25 mg of THC. If one were to try and match this dose using a 90% THC by weight concentrate, he or she would only have to smoke or vaporize roughly 28 mg (about the size of a pea). The discrepancy in dosage size between herbal and concentrated cannabis products can lead users of these products to take too high of a dose, and adverse effects, such as psychosis or cognitive impairment, can develop.[12]

Edible Cannabis

Orally ingested cannabis products, commonly called *edibles*, are an increasingly popular route of consumption. Some of the earliest records of cannabis use document that it was taken orally, often as a drink concoction used in spiritual ceremonies and as a medicine.[1] In recent years, diverse oral cannabis products have begun to be mass produced. In the state of Oregon, for example, where recreational cannabis is legal, dispensaries sell myriad food items in cannabis-infused forms, including beverages, candies, cookies, honey sticks, butter, and cooking oils. Although local laws governing these products vary, package labels often list the total milligrams of THC and CBD. Products range from containing 2.5 mg of THC, equivalent to the lowest dose of dronabinol, to 1 g of THC.

When cannabis products are ingested orally, THC is absorbed inconsistently and is extensively metabolized via first-pass effect. Users typically experience the effects of THC about 2 to 4 hours after ingestion, and its effects last for 6 to 8 hours.[13] Studies have shown that for every 1 mg of THC consumed via smoking or vaporizing, about 2.5 mg of THC need to be ingested to experience the same effect.[8,10] However, persons who ingest cannabis products often experience a more intense and longer-lasting effect. This intensification likely occurs because when cannabis is ingested, THC is hydroxylated in a higher amount to 11-OH-THC, a highly active metabolite, by the cytochrome p450 enzyme, when compared with smoking.[13]

Homemade Cannabis Oils and Topicals

Another increasingly popular form of cannabis concentrates are cannabis oils, often called *Rick Simpson Oil* or *RSO*.[14] Cannabis oils are crude concentrates often made at home by users. Simple extraction methods, such as grain alcohol extraction or cooking herbal cannabis in fatty substances (eg, naphtha, butane, coconut oil, olive oil), are used.[14] Cannabis oil has seen a surge in popularity second to their purported anticancer properties; however, while THC has shown some antitumor properties, cannabis oil has not been shown to be an effective anticancer agent.[15] Because these oils are often homemade, estimates of dosing are difficult. Cannabis oils are often taken orally as a liquid, sometimes incorporated into food items, and rarely smoked after adding to herbal cannabis. Additionally, cannabis oils are used topically. Very few studies have been done regarding the use of topical cannabis products. The limited available data suggest that topical cannabinoids can be absorbed with systemic effect when in specific carriers.[16] Most topical cannabis available commercially is in the form of lotions, creams, and oils that do not absorb well systemically. These topical preparations may help with inflammation and pain at a local level,[16] but systemic absorption by this route is likely negligible, and users will not feel intoxicated.

Counseling Patients

When counseling patients who use cannabis, it is important to convey that smoking-related illnesses can occur. Impaired driving is also a significant concern—even in states where recreational cannabis is legal, driving under the influence is still a crime. From a psychiatric perspective, we strongly discourage cannabis use in patients who have bipolar disorder, are at risk of developing psychosis, or have social anxiety disorder. Also, there is a theoretical risk of fungal infection from smoking moldy cannabis. Some longer-term effects associated with cannabis use include impaired memory, impaired concentration, and amotivation. When cannabis use starts to impair an individual's

health status or social or occupational functioning, this may be a sign of overuse. These individuals should be counseled to stop using cannabis or referred to substance abuse treatment providers.

Physicians have little reason to advocate for cannabis use, as data are limited on its beneficial effects. If a patient insists on using cannabis, recommendations should be to use the smallest amount. For example, if a patient wishes to use cannabis to manage neuropathic pain, he or she should try a topical preparation first. Patients with lung disease or cardiovascular disease should consider edible rather than inhaled products. Theoretically, vaping may allow users to avoid some of the toxic substances produced when smoking cannabis; however, data supporting the safety of this route of consumption are lacking.[17]

Of note, edible cannabis products can easily be mistaken for those without cannabis, resulting in accidental ingestion. Children are particularly at risk—edibles tend to be sweets, and packaging is sometimes designed to mimic familiar products, such as candy bars. During clinical visits, physicians should advise cannabis users on the safe storage of cannabis products to avoid accidental ingestion by children or other cohabitants. Cannabis, whether for medical or recreational purposes, is best treated as a controlled substance; using lockboxes, concealed storage, and not broadcasting use of these substances will help ensure the safety of others in the home.

Conclusion

As attitudes shift toward increased acceptance of medical and recreational cannabis use, we expect that the cannabis industry will continue to grow and produce an even wider range of cannabis products for consumption. Clinicians therefore face the challenge of keeping up with the evolving use of cannabis to better assess and treat use disorders and counsel patients who choose to use cannabis for medical or recreational purposes.

References

1. Wills S. Cannabis use and abuse by man: an historical perspective. In: Brown DT, ed. *Cannabis: The Genus Cannabis*. Amsterdam, The Netherlands: Harwood Academic Publishers; 1998:1-28.
2. State marijuana laws in 2018 map. Governing website. http://www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html. Updated January 8, 2018. Accessed January 11, 2018.
3. Pertwee RG. Pharmacological actions of cannabinoids. *Handb Exp Pharmacol*. 2005;(168):1-51.
4. Pertwee RG. The diverse CB_1 and CB_2 receptor pharmacology of three plant cannabinoids: Δ^9-tetrahydrocannabinol, cannabidiol and Δ^9-tetrahydrocannabivarin. *Br J Pharmacol*. 2008;153(2):199-215.
5. Colizzi M, Bhattacharyya S. Does cannabis composition matter? differential effects of delta-9-tetrahydrocannabinol and cannabidiol on human cognition. *Curr Addict Rep*. 2017;4(2):62-74. doi:10.1007/s40429-017-0142-2
6. Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: a systematic review and meta-analysis. *JAMA*. 2015;313(24):2456-2473. doi:10.1001/jama.2015.6358
7. Rong C, Lee Y, Carmona NE, et al. Cannabidiol in medical marijuana: research vistas and potential opportunities. *Pharmacol Res*. 2017;121:213-218. doi:10.1016/j.phrs.2017.05.005
8. Abramovici H. *Information for Health Care Professionals: Cannabis (Marihuana, Marijuana) and the Cannabinoids*. Ottawa, Ontario: Health Canada, Controlled Substances and Tobacco Directorate at Health Canada; 2013.
9. Hill KP. *Marijunana: The Unbiased Truth About the World's Most Popular Weed*. Center City, MN: Hazelden Publishing; 2015.
10. Zuurman L, Ippel AE, Moin E, van Gerven JM. Biomarkers for the effects of cannabis and THC in healthy volunteers. *Br J Clin Pharmacol*. 2009;67(1):5-21. doi:10.1111/j.1365-2125.2008.03329.x
11. Loflin M, Earleywine M. A new method of cannabis ingestion: the dangers of dabs? *Addict Behav*. 2014;39(10):1430-1433. doi:10.1016/j.addbeh.2014.05.013
12. Pierre JM. Risks of increasingly potent *Cannabis*: the joint effects of potency and frequency. *Curr Psychiatry*. 2017;16(2):15-20.
13. Huestis MA. Human cannabinoid pharmacokinetics. *Chem Biodivers*. 2007;4(8):1770-1804.
14. Romano LL, Hazekamp A. Cannabis oil: chemical evaluation of an upcoming cannabis-based medicine. *Cannabinoids*. 2013;1(1):1-11.
15. Galve-Roperh I, Sánchez C, Cortés ML, Gómez del Pulgar T, Izquierdo M, Guzmán M. Anti-tumoral action of cannabinoids: Involvement of sustained ceramide accumulation and extracellular signal-regulated kinase activation. *Nat Med*. 2000;6(3):313-319.
16. Touitou E, Fabin B, Dany S, Almog S. Transdermal delivery of tetrahydrocannabinol. *Int J Pharm*. 1998;43(1-2):9-15.
17. Giroud C, de Cesare M, Berthet A, Varlet V, Concha-Lozano N, Favrat B. E-cigarettes: a review of new trends in cannabis use. *Int J Environ Res Public Health*. 2015;12:9988-10008.