

Marijuana a Dental Dilemma

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Introduction

When marijuana is ingested or inhaled by a human the user experiences a subjective “high”. This effect is brought on by the main psychoactive component or marijuana: Δ 9-Tetrahydrocannabinol (Δ 9-THC). There are other psychoactive and non-psychoactive cannabinoid compounds that may also contribute to effects on organs systems in the human body. Marijuana exerts its effects through cannabinoid receptors (CB1 and CB2). CB1 receptors are present in the CNS, heart, and many other organ systems. CB2 receptors are mainly found among immune cells, including the spleen and tonsil [1].

More and more states are decriminalizing and legalizing the use of medical and recreational marijuana. Therefore, as a dentist it is important to know the systemic effects of marijuana on the human body. The primary concern with marijuana usage is not typically acute toxicity, but rather its effects on organ systems, which may precipitate adverse events during dental or surgical procedures. Marijuana has important effects that mainly affect the function of the central nervous system (CNS), cardiovascular system, and respiratory system [2]. These systemic effects, and are often not realized by the dental practitioner.

Cardiovascular Implications

The cardiovascular organ system is significantly affected by marijuana inhalation. It has been reported that there is a 20-50% increase in heart rate from 15 minutes after inhalation up to 3 hours [3]. There are also changes in blood pressure depending on position of the patient. When standing, marijuana causes a decrease in blood pressure, however, when sitting or supine marijuana causes blood pressure to rise. Marijuana users therefore typically tend to have a larger drop in blood pressure upon standing from a sitting or supine position [3,4]. Tobacco cigarette are shown to increase carboxyhemoglobin concentration, and a marijuana cigarette

increases the carboxyhemoglobin concentration 5x more than tobacco. Exercise tolerance tests in patients with preexisting heart disease showed a halved time to cause chest pain after smoking a marijuana cigarette, compared to a placebo cigarette [5]. These adverse effects on the cardiovascular system cause and increased oxygen demand by the myocardial cells due to increased work by the heart. Depending on you patient’s medical history they may or may not be at risk for adverse cardiac effects when using marijuana [3].

These changes in heart rate and blood pressure are less noticeable in a frequent marijuana user because the human body develops tolerance to the marijuana’s effects on the cardiovascular system. Therefore, changes are most drastic in infrequent marijuana abusers [3]. Cardiovascular changes resulting from marijuana use have a differential effect by patient age. Although there are dramatic changes in heart rate and blood pressure this rarely causes adverse effects on young healthy patients. However, elderly patients especially those whom have ischemic heart disease may have an increased risk for adverse effects (such as stroke, heart attack, or worsened angina pectoris) after the use of marijuana [2].

One reason for thorough medical history taking in the dental office is to know if the patient is at high risk for a medical emergency. Increased demand for oxygen after marijuana usage in a patient with preexisting ischemic heart disease may raise concern when performing stress provoking dental procedures. Another concern is the more dramatic difference in blood pressure upon standing from a sitting position. This may cause patients to develop a more dramatic orthostatic hypotension especially when these patients are sitting for a long dental procedure. Angina pectoris and orthostatic hypotension are the third and fourth most common medical emergency in the dental chair, respectively [6]. These effects of marijuana may therefore contribute to common medical emergencies in the dental clinic

Marijuana users that also have ischemic heart disease, hypertension, and cerebrovascular disease may experience cardiac arrhythmias, chest pain, and MI [2]. Marijuana induced tachycardia can be counteracted by Beta-blockers, which leaves us with a possible way to control one of the cardiovascular effects of marijuana [1].

Respiratory System

Chronic cannabis usage has been linked to adverse effects on the respiratory system, for example: Squamous cell carcinoma, decreased respiratory function, laryngospasm, Uvular edema, and chronic bronchitis [2,5]. Chronic cannabis use has been shown to cause symptoms of chronic bronchitis. These symptoms include coughing, sputum production, and wheezing. Chronic cannabis and tobacco smokers have the same rates of chronic bronchitis; the rate of chronic bronchitis is higher in smokers of either type than non-smokers. Over time both cannabis and tobacco have been shown to decrease respiratory function. Tobacco cigarettes tend to affect the small sized airways, where marijuana smoke tends to affect the large-medium sized airways [2].

Laryngospasm and symptoms of chronic bronchitis are both airway concerns. Increase in these scenarios during operations may lead to serious adverse outcomes, especially if the patient is undergoing sedation in an office setting. In a chronic marijuana abusing patient it is important to protect the airway and adequate suction to remove secretions. Along with adequate suction medications such as glycopyrrolate may be utilized to decrease secretions. Uvular edema after marijuana inhalation can also cause major airway concerns. If this occurs, it is important to maintain a patent airway and administer dexamethasone or other steroids to reduce this airway blockage [7].

Salivation

Saliva is an important component of our oral hygiene and oral function. One very important quality of saliva is that it acts as a cleansing solution and prevents dental caries. Marijuana cigarette inhalation showed significant post-inhalation decrease in saliva flow. Saliva flow was significantly negatively correlated with plasma drug levels of THC, and also with the high that lasted 2-4 hours post-inhalation [8]. Further research focusing on the composition/quality of saliva after marijuana intoxication could yield important information on the dental caries risk of marijuana abusers.

Memory and Altered Mental Status

There are marked CNS effects of marijuana that possibly include the following: panic attacks, amnesia, anxiety, delusions, hallucinations, agitation, and hypomania [2]. The length of subjective high and therefore possible amnesia and altered sensations are variable depending on the amount of marijuana inhaled or ingested orally. However, typically the subjective high lasts ~4 hours after inhalation of marijuana smoke and about 6 hours after ingestion via the oral route. Although the high lasts for only 4 - 6 hours the time to reach an undetectable amount in the blood stream is anywhere from 6 - 12.5 hours. When obtaining informed consent for elective procedures the dentist may consider

whether their patient has recently abused marijuana [1].

Route of Administration	Time of Peak Plasma Concentration	Low Plasma Levels of THC	Peak Subjective "High" (after administration)	Subjective High Duration (after administration)
Inhalation	3 - 10 mins	7.2 - 12.5 hrs (< 0.5µg/L)	20 - 30 mins	~4 hours
Ingestion	60 - 120 mins	Highly Variable	2-4 hrs (onset 30 - 90 mins)	~6 hours
Intravenous	Upon Administration	6 hrs (< 2µg/L)	20 - 30 mins	~4 hours

Table 1: Plasma concentration and subjective "high" measurements after administration of THC in humans using different administration methods [1].

Often dentists need to obtain informed consent from their patients. It may not be ethical to have a patient sign an informed consent, if they have recently inhaled or ingested marijuana. Patients who are "high" from marijuana often exhibit short term amnesia, confusion, and hypomania [2]. Therefore, those whom are subjectively high may simply forget or may not listen to the information that is presented. Patients that have recently abused marijuana may need to be rescheduled in order for their subjective high to diminish. Although a patients subjective high is quite diminished it may be safer to wait until plasma levels have decreased to undetectable levels. Plasma levels actually begin to decrease by the time the subjective high is at its highest. Therefore, the plasma levels do not exactly parallel the patient's experiences. With low levels of subjective high being reached at 4-6 hours it may be appropriate to wait 8-10 hours to obtain consent. However, rescheduling for the following day, assuming abstinence during this period, would be safe in the case of heavy marijuana usage on the day of informed consent.

Periodontal Disease

Since many of the compounds and non-THC products found in marijuana smoke are similar to tobacco it may follow that marijuana has a similar effect on periodontal tissues. A study from the NIH has shown that regular marijuana smoking alone in patients under the age of 32 is a strongly associated with the prevalence and incidence of periodontal attachment loss at 32 years old [9]. Smoking of marijuana may be a risk factor for development or progression of periodontal disease.

Post-Operative Analgesia

Research has been performed regarding marijuana's effects on analgesia in cases of both acute and chronic pain. As dentists we typically encounter situations where patients are in acute pain from odontogenic infections, trauma, or surgical operations. A research article published on Jamaican marijuana abusers suggests that marijuana abuse may lead to elevated levels of post-operative pain. This study was carried out on Jamaican marijuana abusers that had undergone elective orthopedic operations. The researchers found that chronic cannabis users had a significantly greater mean pain intensity difference in the first post-operative hour. These same patients also exhibited and increased need for rescue analgesia 6

hours post-operatively [7].

Research would be needed to determine whether marijuana abuse affects acute pain response from odontogenic infections or surgical operations on the head and neck. The mechanism in which chronic marijuana abuse causes increased postoperative pain has not been explicated. However, since many oral and maxillofacial surgeries include damage to bony structures chronic marijuana may also cause heightened acute pain responses.

References

1. Grotenhermen F. Pharmacokinetics and Pharmacodynamics of Cannabinoids. *Clinical Pharmacokinetics*. 2003; 42: 327-360.
2. Hall W, Degenhardt L, Lynskey M. The Health and Psychological Effects of Cannabis Use. 2001.
3. Hall W, Solowjj N. Adverse Effects of Cannabis. *The Lancet*. 1998; 352: 1611-1616.
4. Mittleman MA, Lewis RA, Maclure M, et al. Triggering Myocardial Infarctions by Marijuana. *American Heart Association Circulation*. 2001; 103: 2805-2809.
5. Mallat A, Roberson J, Brock-Utne JG. Preoperative Marijuana Inhalation – an Airway Concern. *Canadian Journal of Anesthesia*. 1996; 43: 691-693.
6. Malamed SF. Managing Medical Emergencies. *JADA*. 1993; 124: 40-53.
7. Jefferson DA, Harding HE, Cawich SO, et al. Postoperative Analgesia in the Jamaican Cannabis User. *Journal of Psychoactive Drugs*. 2013; 45: 227-232.
8. Mattes RD, Shaw LM, Engelman K. Effects of cannabinoids (marijuana) on taste intensity and hedonic ratings and salivary flow of adults. *Chem Senses*. 1994; 19: 125-140.
9. Murray Thomson W, Richie Poulton, Jonathan M. Broadbent, et al. Cannabis Smoking and Periodontal Disease among Young Adults. *JAMA*. 2008; 299: 525-531.