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Cannabidiol, the Journey of Cannabis from a Social Stigma to a Miracle Drug in Dentistry

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Mini-review Article

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ABSTRACT

In recent years, there has been a surge in the awareness regarding the phyto cannabinoid; cannabidiol. Between the time period from 1963 to 2000, only 460 publications can be found in a PubMed search while using cannabidiol as the keyword. The former pales in comparison to the record of 2769 publications found from 2008 to the present time. However, a limited amount of literature is available that discusses the therapeutic potential of cannabidiol, pertaining to the field of dentistry. In 1940, cannabidiol was isolated from cannabis for the first time, its structure being reported much later in 1963. Further research on Cannabis resulted in the declaration that "THC" is the active compound. Subsequent studies were then directed essentially based on the virtual exclusion of cannabidiol and other cannabinoids from cannabis. This was primarily due to the belief that the activity of cannabis was merely psychological activity.
In retrospect, this seems unfortunate as many of the beneficial properties of cannabidiol which

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might have had a therapeutic benefit were overlooked. In the present review, attention will be focused on the therapeutic potential of Cannabidiol and the impact this may have on dentistry with the supplemental vision of encouraging further studies to reveal any other beneficial properties that may be present.

Keywords: Cannabinoid; dentistry; analgesia; antibacterial; osteogenesis; myorelaxant.

1. INTRODUCTION

When the topic of cannabis comes into discussion, the first thing that comes to mind is its psychoactive properties and tendency for drug abuse. However, evidence of the usage of cannabis Sativa or marijuana has been appreciated in ancient medicine. There are a various number of traditional medical sciences that utilize it for its numerous properties. The only physical evidence of its use in ancient medical practice dates back to 400 AD [1]. It was ascertained through extensive research in the field that THC (∆9-tetrahydrocannabinol) causes a psychotomimetic effect or "the high." Cannabidiol, on its own, is not capable of producing such an effect [2,3]. Instead, CBD boasts a wide range of medicinal properties that might prove therapeutic. These properties include but may not be limited to an antipsychotic impact [4,5], analgesic property, neuroprotective effect, antiemetic effect, antioxidation, anti-epileptic, anti-inflammatory [6,7], anti-arthritic, and anti-neoplastic properties. These are being researched to uncover the true therapeutic potential of cannabidiol. They may also be a helpful aid in the general dental practice in various situations that are further described.

2. PROCEDURE

We carried out a review of the literature on the subject in the PubMed database. We used the keywords 'cannabinoids', 'cannabidiol,' and 'Dentistry' to search for full articles published in English from 1963 to 2021. Additional papers were obtained from the reference lists in the 'hits.' Classic and more recent studies covered Controlling Inflammation, Oral prophylactic potential, Treating Anxiety, Analgesic & Post-Treatment Pain Management, Osteogenic potential, and The Future of Cannabidiol in Dentistry. The studies relevant to dentistry were included in this review.

3. CONTROLLING INFLAMMATION

Many clinical and in vitro studies have assessed the anti-inflammatory effects of CBD and came up with promising results [6-9]. Artificially induced oral ulcers demonstrated in the experimental procedure in Wistar rats presented with a lower inflammatory score in 3 days. This study evaluated the healing of ulcers clinically and histologically after intraperitoneal injection of CBD. The ulcers were standardized in dimension and were made by a single operator. A blinded examiner examined and scored the healing after 7 or 3 days. Although no significant difference was found in healing scores of controls and CBD group at seven days intervals, histological analysis revealed the superior organization of tissue with CBD therapy [10]. In another study on mice, researchers induced oral mucositis in CF-1 strain mice using 5-Fluorouracil chemotherapy preceded by mechanical trauma inflicted by an 18-gauge needle in 4- or 7-day intervals. 2 blinded examiners did the evaluation of outcome. clinical and histological analysis, following intraperitoneal injection of 3 or 10 or 30 mg of CBD per kg of body weight revealed that the groups treated with cannabidiol exhibited a lowered intensity of the lesion when compared with the positive control group with a statistical difference [11].

Hence, it can also be inferred that CBD might display anti-inflammatory properties, which can be helpful as medication after oral surgical procedures such as dental implants, exodontia, etc. The iatrogenic inflammation induced by periodontal techniques such as scaling and root planning may also be reduced with CBD. Although the precise pathway of inflammation reduction caused by CBD is still unclear, it is demonstrated that CBD causes either modulation or impediment of cytokines [12].

4. ORAL PROPHYLACTIC POTENTIAL

Bactericidal properties of 12.5 % CBD have also been demonstrated by researchers in a study where they collected dental plaque from participants to observe the effect of various cannabinoids on bacterial reduction against other commercially available toothpaste (Colgate, Oral-b, Cannabite F) in vitro. They found that all

the groups in which cannabinoids were administered presented a lower bacterial count than commercially available toothpaste. They included all possible stages of periodontal status ranging from non-bleeding gums to gums having increased resorption of bone and increased mobility of teeth [13]. Another study compared the efficacy of CBD against 0.2% chlorhexidine-containing over-the-counter mouthwash in vitro. Although the study did not disclose the name of the commercial products tested, they described one as essential oil-based and the other as alcohol-based. The results revealed that less than 1 % of CBD by weight is as effective as 0.2 % of chlorhexidine [14]. This implies that it might play a role in averting oral cavity infections.

5. TREATING DENTAL ANXIETY

Anxiety and fear are adapted responses that, through evolution, are essential to cope with any threat that might endanger the organism's survival. Similar psychological and physiological responses are observed worldwide in dental treatment patients. These responses only scare the patient further and hinder the clinician regarding dental procedures [15]. Simply ignoring this issue may lead to phobia, degraded interest in care seeking for oral health, and even discontinuing the ongoing treatment [16,17]. CBD presents a great choice for patients and doctors seeking a way to substitute the routinely used medications for relieving dental anxiety. CBD has been researched extensively for relief from various anxiety-r disorders. It could potentially help in reducing feelings of discomfort and preventing episodes of panic on the dental chair. Cannabidiol has proven itself an effective anxiolytic drug in animal model studies, leading the way to research on human subjects. It was not until the 1980s that clinical research was attempted to examine the effects of Cannabidiol on anxiety [3,18]. Interestingly cannabidiol was found to cause attenuation of anxiety and psych activity caused by THC in healthy subjects [4]. Subsequent studies took a step forward wherein they involved healthy subjects and individuals that were diagnosed with a social anxiety disorder to make it evident that cannabidiol may be capable of resolving anxiety in humans [5,16,17]. A study on patients with severe anxiety disorders such as post-traumatic stress disorder revealed that administration of Cannabidiol orally and routine psychiatric care might reduce symptoms [9]. To affirm this fact, modification of blood flow in specific structures of the brain (cingulate cortex, amygdala, hippo, campus, and hypothalamus) that are associated with anxiety, as seen in neuroimaging techniques post cannabidiol administration [17,19]. With the aid of Cannabidiol, clinicians can avoid conventional sedation techniques such as nitrous oxide and Benzodiazandng with their side effects, thereby achieving an improved safety profile. This helps relieve their anxiety and discomfort while undergoing procedures.

6. ANALGESIC & POST-TREATMENT PAIN MANAGEMENT

Our knowledge of the function of cannabidiol in pain management has yet to broaden; evidently, the analgesic effect of cannabidiol is seen due to the modulation & interaction of numerous involved systems (inflammatory, nociceptive, and endocannabinoid systems) [19]. Health Canada approved its use for pain management in multiple sclerosis in 2005. In 2007, they approved cannabidiol as a therapeutic drug in cancer pain that is unresponsive to conventional opioid therapy [20]. Cannabidiol has also shown great potential in managing pain in subjects with induced myofascial pain following the intramuscular injection of CBD [21-23]. It has also proven to be a potent analgesic when used to treat other difficult-to-manage pain. This implies that cannabidiol may be a potential alternative to conventionally used pharmaceuticals when treating and managing pain experienced by oral carcinoma, burning mouth syndrome, salivary gland stones, neuralgia, and after an oral surgery like a tooth extraction or implant placement. While traditional pharmaceuticals like opiates are effective at controlling pain, they are highly habit-forming and often cause uncomfortable side effects like hyperacidity, nausea & vomiting [24]. Cannabidiol offers a suitable alternative, a more natural technique for managing pain-free side effects.

7. OSTEOGENIC POTENTIAL

A group of researchers conducted a study to evaluate the effects of cannabidiol on differentiation mesenchymal stem cells and compare them with vitamin D3. Mesenchymal stem cells derived from the apical papilla, dental follicle & dental pulp were utilized for the experiment. The study concluded that even a minute dose of cannabidiol could drastically enhance cell differentiation, particularly for the dental follicle and apical papilla *In vivo* [25]. Another study was conducted on rat models,

wherein artificially induced periodontal lesions were treated with intraperitoneal administration of cannabidiol mixed in a 2 % tween 80. Statistical analysis of the data obtained from the study revealed that cannabidiol reduced bone loss significantly.

8. MYORELAXANT EFFECT

Most intraoral dental procedures force the patient to open their mouth for long periods to enable better illumination and visualization of the working field by the clinician. If the process is time-consuming, it can cause muscle fatigue, decreasing the mouth opening, reducing the clinician's visibility and accessibility, and increasing the chair time. Increased duration of mouth opening may also precipitate the development of Temporomandibular disorders or aggravate the pre-existing conditions already present in the patient, which would regrettably be iatrogenic and easily avoidable with appropriate medications, for which cannabidiol is a candidate [21].

9. THE FUTURE OF CANNABIDIOL IN DENTISTRY

More studies must be conducted to establish a proper dosing protocol and appropriate, prescribed, and controlled usage of cannabidiol in the general dental scenario. There are many benefits associated with cannabidiol, and it may prove helpful for clinicians and patients when managing pain, inflammation, and anxiety in the clinical set-up. Owing to its all-natural composition coupled with the absence of significant complications, it would not be startling to see an increase in the utilization of cannabidiol in dental offices and become a norm in the not-so-distant future.

10. CONCLUSION

Cannabidiol is a novel and fast-emerging pharmacological alternative to many conventional drugs in dentistry. As described in many alternative medicine practices, with more research and innovative approach, it could also become a miraculous one for all dentistry drugs.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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