Chapter 4
Medical Cannabis in the Treatment of Epilepsy

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ABSTRACT

Epilepsy is one of the most known neurological diseases of therapeutic challenge. Medical marijuana/ medicinal cannabis is a cannabinoid phytochemical derivative of the cannabis plant used for medical purposes in treating seizures and has increased sharply in current years. Cannabis plants contain over 100 cannabinoids, and evidence supports its practice in the treatment of a few childhood epilepsies. The active and major cannabinoids such as delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) exist in the cannabis plant and are the topic of the present study. Cannabinoids' biological activities are facilitated by their interaction with two similar receptors, cannabinoid receptor type 1 (CB1) and type 2 (CB2), as well as a wide range of other receptors and targets implicated in the effects of these compounds. The review will focus on the effectiveness and challenges of cannabinoids in treating epilepsy.

INTRODUCTION

Epilepsy is a progressive neurodegenerative disorder of motiveless, recurrent seizures, which is an abrupt burst of abnormal electrical brain activity. Conferring to the World Health Organization (WHO), epilepsy distresses 50 million people establishing 1% of the global problem of disease. Epilepsy can be developed by anyone, but more frequently onsets in young children and older adults. It is reported in 2021 that males develop epilepsy more often than females, perhaps due to more exposure to menace factors like head trauma and alcohol usage. Seizures are the foremost symptom of epilepsy and symptoms of seizures vary from person to person. A minor seizure may be hard to distinguish, it might last for a few seconds, and the individual may remain conscious while it happens. Symptoms of mild seizure comprise

modifications in the sagacity of sight, perception, aroma, auditory, sense of touch, numbness, disorientation, and limb cramping. Robust seizures can induce tremors and overpowering muscle twitches that can last for a few seconds to quite a few minutes may cause confusion or loss of awareness and may lead to memory loss in the period after the seizure. Other manifestations include expression less staring, being inattentive, and doing monotonous motions.

Generalized and focal seizures are two different types of seizures. Generalized seizures involve the whole brain, whereas focal seizures or partial seizures affect only a portion of the brain. Generalized seizures comprise the entire brain and subtypes consist of 1) Absence seizures, often known as "petit mal seizures," induce a sudden loss of attention, a blank look, and repetitive actions such as lip smacking or blinking. 2) Tonic seizures produce muscular stiffness in the legs, arms, or trunk. 3) Atonic seizures cause loss of muscular control, sometimes known as "drop seizures," since the unexpected loss of muscle power can cause a rapid fall. 4) Repetitive, jerky muscular movements of the face, neck, and arms characterize chronic seizures. 5) Myoclonic seizures are characterized by impulsive, rapid twitching of the arms and legs that might congregate at times, 6) Tonic-clonic seizures, sometimes known as "grand mal seizures," are characterized by symptoms such as body rigidity, shaking, lack of bladder or bowel control, tongue biting, loss of awareness following a seizure, and feeling mildly uncomfortable for a few hours.

There is no cure for epilepsy at present; nevertheless, it is possible to achieve success with drugs and other strategies including vagal nerve stimulation and ketogenic diets. Archeologically, there are earlier and ancient records of people utilizing medicinal cannabis to treat epilepsy. In the 19th century (1843) an Irish physician, Dr. O'Shaughnessy, first introduced medicinal cannabis into Western medicine stimulated by his understandings and studies from his period working in India with the East India Company. He detected that cannabis tinctures fixed seizures in a febrile infant, demanding that medicine had found an anticonvulsant of the peak order (O'Shaughnessy, 1843). His publications supported cannabis use in Victorian England. Two notable neurologists of that era, J.R. Reynolds and William Gowers documented their practices with cannabis, predominantly for the cure of epilepsy. However, in the 20th century, varying public morals and worries about cannabis's psychoactive properties galvanized the global illegalization of cannabis. The cure for epilepsy remains an important clinical problem. Recently, the public and physicians have had considerable interest in using medical marijuana or its derivatives to treat seizures.

Marijuana is a preventative agent that has demonstrated a therapeutic advantage in both induced and unprovoked seizures in males (Gordon and Devinsky, 2001). Marijuana use can cause an ictal episode and act as a proconvulsant (Kolikonda et al. 2016). In a clinical vignette, medicinal marijuana was supplied to two adult volunteers for the treatment of focal epilepsy, which resulted in almost perfect seizure control (Hegde et al. 2012). Medical marijuana for epilepsy established a substantial consideration after the case statement of pediatric refractory epilepsies cured practically and unbelievably by cannabis extracts. Later on, innumerable families whose adherents are affected by epilepsy went to states like Colorado where medical marijuana was legal and accessible for treatment. The genus *Cannabis* belongs to the family *Cannabaceae, which* encompasses two species; *sativa* and *indica* (flowering plants) native to Central and South Asia. Cannabis was used for ages to harvest hemp fiber for bowstrings, seed oil, paper, livestock feed, and medicine. Hemp is a type of *Cannabis sativa* L. extracted from hemp plants, classified as marijuana. Historically, *Cannabis sativa* and its sister species *Cannabis indica* has been utilized to treat people with epilepsy for centuries. The healing potential of cannabinoid compounds resulting from these plants precisely has shown promise as an anticonvulsant with innovative mechanisms of action.

Most commonly, the leaves and female flowers of the cannabis plant are referred to as marijuana, but medical cannabis represents either the entire plant marijuana or chemicals in the plant utilized for medical

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