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Effect of Canabidiol in the Treatment of Epilepsy

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Abstract: One of the most current discussions these days is about the benefits of using the medicinal plant *Cannabis sativa*, generally known as marijuana or cannabis. Studies have been proving the effectiveness of cannabidiol as a therapeutic resource in psychic disorders, such as anxiety, schizophrenia and epilepsy. Latter, is a chronic disorder that occurs mainly in childhood and adolescence, characterized by excessive and abnormal activity of brain cells. The purpose of this paper is to evaluate the applicability of Cannabidiol against the symptoms of epilepsy, being a retrospective review from articles published in the period of 2014 to 2018. In 2001, studies demonstrated the efficacy of cannabidiol in the treatment of seizures in children. Unlike the adverse side effects of current antiepileptic drugs, such as dizziness and vomiting, the effects of cannabidiol are almost nonexistent, in both short and long term use. The mechanism of action of cannabidiol is given by activating Cannabidiol receptors (CB1 and CB2) that coupled to an inhibitory G protein acts on the receptors by inhibiting synaptic transmission by blocking voltage-dependent calcium-activated potassium channels. In this context, cannabidiol (CBD) exerts its anticonvulsive function through neuroprotective mechanisms or through neural excitation/inhibition balance. Thus, it is believed that the endocannabinoid system can inhibit episodes of seizures. Studies indicate that this active substance should be used with a vaporizer to reduce the harmful effects of smoke, as well as its use in oil, especially for children and adolescents. Therefore, research has shown that Cannabidiol has broad therapeutic potential in central nervous system disorders, but further studies should be performed, both for the confirmation of these pharmacological effects and for proper approval in the treatment of seizures.

Keywords: Cannabis sativa; Cannabinoids; Cannabidiol; Epilepsy.

1. Introduction

The plant *Cannabis sativa*, popularly known in Brazil as "marijuana", has 400 substances, but only 60 compounds are considered cannabinoids (GONÇALVES, 2014). The cannabinoids are divided into psychoactive cannabinoids, where Δ^9 -tetrahydrocannabinol (Δ^9 THC) is present, and the non-psychoactive cannabidiol (CBD) (VOZ, 2008). Several studies show that cannabidiol can be used in treatments of various diseases, such as diabetes, epilepsy, anxiolytic and antipsychotic properties, among others (VOZ, 2008).

2. Results and Discussion

The endocannabinoid system is responsible for producing a response to epileptiform activity. CB1 receptors, located mainly in presynaptic neurons of the CNS, mediate the psychotropic effects of cannabinoids, being found in high amounts in the hypothalamus, cerebral cortex and cerebellum (GUINDON; HOHMAN, 2009; SAGAR et al., 2009).

CB2 receptors are predominantly located in immune cells, and are traditionally referred to as peripheral cannabinoid receptors. However, recently CB2 receptors have been identified in specific areas of the CNS, such as in microglia and post-synaptic sites (MATOS et al., 2017), in addition to acting on the immune system for being found in lymphoid tissues, spleen, and membranes of circulating monocytes and mast cells (RANG et al., 2007; PERNONCINNE; OLIVEIRA, 2014). Recent studies have shown that CB2 receptors can also be expressed in neural cells

3. Materials and Methods

The data were retrospectively collected from reviews and bibliographical articles in

Epilepsy is a chronic disorder that occurs mainly in childhood and adolescence. It is defined as a neurological disorder characterized by excessive and hypersynchronous neuronal activity, presenting seizures (GUYTON; HALL, 2011; PASTORELLO; CAO; TREVISAN, 2011), causing, for example, changes in consciousness, or motor, sensory and autonomic events. Seizures can be caused by clinical problems such as head injury, infectious diseases of the central nervous system, or drug withdrawal. However, the exact cause remains unknown. (SCHELLACK, 2008).

involved in the perception and modulation of pain (ZHANG et al., 2003; ELMES, 2004).

CB1 and CB2 receptors are coupled to an inhibitory G protein which, when activated, inhibits the enzyme cyclase, leading to decreased cyclic AMP levels and inhibition of calcium channels. Activation of CB1 receptors inhibits the release of neurotransmitters, inhibitory or excitatory (PEDRAZZI et al., 2014). In epileptic seizures there is excessive release of glutamate, excitatory neurotransmitter, and union with glutaminergic receptors in large numbers, leading to the abnormal release of Ca^{2+} into the postsynaptic neuron. Associated with the mutations that lead to the low production or inefficiency of the GABA inhibitory neurotransmitter, the consequences are excessive, sudden and recurrent discharges into the cerebral cortex, as evidenced in epileptic seizures, depending, therefore, on the balance between the neurotransmitters (BRAGATTI, 2014; LUTZ, 2004).

search of theoretical-methodological basis for the development of the study, the research period was

from 2014 to 2018. Clinical studies have been conducted investigating the efficacy of

cannabidiol as an adjuvant therapy for seizures in patients.

4. Conclusions

It is possible to conclude that cannabidiol has broad therapeutic potential in disorders of the central nervous system. Studies shows that Cannabis sativa has a high pharmacological potential in the treatment of seizures, but more

studies should be performed both for the confirmation of these pharmacological effects and for the proper approval in the medical use in treatments of anxiety, schizophrenia, epilepsy, among other pathologies.

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