Evaluation of the Neuroprotective Role of Cannabidiol in a Cellular Model of Human Dopaminergic Neuron

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Introduction: It is well established that oxidative stress plays a major role in several neurodegenerative conditions. Hence, we explore the neuroprotective and antioxidant capacity of new neuroactive compounds with therapeutic potential, such as phytocannabinoids molecules. The cannabidiol (CBD), a component of Cannabis sativa, has demonstrated therapeutic properties. In this study, we selected a therapeutic dose of CBD with antioxidant activity for further neuroprotection assays, using the differentiated human neuroblastoma SH-SY5Y cell line. Methods: Neuronal differentiation of exponentially growing human neuroblastoma SH-SY5Y cells was triggered by cultivating cells with DMEM/F12 medium with 1 percent of fetal bovine serum with the combination of 10 μM retinoic acid for 7 days. Based on a dose response curve of CBD (1,0; 2,5; 5,0 and 10 μM), cell viability, oxidative parameters and morphological analyses were performed. Hereafter, cells pre-incubated with CBD were challenged with neurotoxins/oxidants and neuroprotective effects of CBD were evaluated. Results and Discussion: The phytocannabinoid tested presented low cytotoxicity and antioxidant properties at 2,5 μM. Pre-treatment of cells for 24 hours leads to neuroprotection against toxicity of the neurotoxins tested, which were directly related to their antioxidant properties. Conclusions: Our results demonstrate that differentiated human SH-SY5Y cells are suitable in vitro model to screen neuroprotective / neurotoxic compounds, and support data in which CBD is appointed as a potential pharmacological and therapeutic drug in the treatment neurodegenerative diseases.

Key Words: Neuroprotection, Oxidative Stress, SH-SY5Y Cell Line

Support: CNPq, CAPES.