

https://dspace.org/

Evaluation of antioxidant properties and neuroprotective effects of methanolic leaf extract of combretum molle in D-galactose-induced aging model of Sprague Dawley rats

Fasemore, Thandi Mamorapelo Dorothy

2024

https://hdl.handle.net/10539/37607

Downloaded from a DSpace repository. https://dspace.org/

ABSTRACT

Several physical and biochemical changes in the body occur because of the biological process of aging. As part of natural aging, the brain encounters morphological and functional changes that affect dendritic trees and synapses, neurotransmission, circulation, and metabolism. The brain's high metabolism, elevated levels of lipids, and inadequate antioxidant defences make it susceptible to oxidative stress. A reducing sugar called D-galactose (D-gal) causes a significant build-up of reactive oxygen species (ROS). *Combretum molle* (*C.molle*) is a plant rich in compounds that scavenge free radicals and is frequently used to cure a variety of human illnesses in African traditional medicine. This study investigated the potential impact of *C.molle* on rat brain aging brought on by D-galactose.

Fifty adult male Sprague Dawley rats were treated for 90 days and were composed of 5 groups (n=10) as follows: I) Control group received saline and distilled water, II) *C.molle* only group received intragastric gavage of *C.molle (500 mg/kg)*, III) D-gal only group received a subcutaneous injection of D-galactose (150 mg/kg), IV) CMD 90 group received D-galactose and *C.molle* simultaneously for 90 days, V) CMD 45 group received D-galactose for the first 45 days and *C. molle* for the remaining 45 days. The animals underwent behavioral evaluation post-treatment for a further period of 7 days twice a day. The rat's cognitive function was evaluated through Novel object recognition and object location tests. The *C.molle* 's neuroprotection was evaluated through levels of acetylcholinesterase (AchE), Acetylcholine (Ach), Brain Derived Neurotropic Factor (BDNF), and Tumor Necrosis Factor (TNF) alpha including the effects on adult neurogenesis through Ki-67 and doublecortin (DCX) immunohistochemistry. The oxidative stress level was measured through the evaluation of lipid peroxidation marker malondialdehyde (MDA), glutathione peroxidase (GSH-Px), glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT) activity.

The *C.molle* significantly attenuated the effects of D-galactose-induced changes in the hippocampus and cortex, ranging from cognitive capacity, and oxidative stress by increasing GSH, BDNF, Ach, GSH-Px, CAT, and SOD activity. Additionally, *C. molle* caused a decrease in the levels of MDA, TNF alpha, and AchE activity, and

ameliorated reduced cell proliferation and neuroblast differentiation brought about by D-galactose.