

Ksh 3,000

COGNITIVE ENHANCING EFFECTS OF AQUEOUS EXTRACTS OF *Amaranthus dubius* Mart. Ex Thell AND *Vigna unguiculata* (L.) Walp. IN MICE

21  
11/3  
2018

KIPKEMOI DAISY JEPKOSGEI (BSc. Biochemistry)  
I56/27498/2018

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE (BIOCHEMISTRY) IN THE SCHOOL OF PURE AND APPLIED SCIENCES AT KENYATTA UNIVERSITY

Kipkemoi, Daisy Jepkosgei  
*Cognitive enhancing effects of aqueous*



FEBRUARY, 2023



**KENYATTA UNIVERSITY LIBRARY**

**DECLARATION**

I Daisy Jepkosgei Kipkemoi, duly declare that this is my original work and has not been presented for a degree in any other university or any other award.

Signature.....

Date.....22/02/2023

**Kipkemoi Daisy Jepkosgei**  
Department of Biochemistry, Microbiology and Biotechnology,  
Kenyatta University.

**SUPERVISORS**

We confirm that the work reported in this thesis was undertaken by the student under our supervision

Signature.....

Date.....22/02/2023

**Dr Mathew Piero Ngugi**  
Department of Biochemistry, Microbiology and Biotechnology,  
Kenyatta University.

Signature.....

Date.....22/02/2023

**Dr. Anthony Ileri**  
Department of Educational Psychology,  
Kenyatta University.

## ABSTRACT

Cognition is the ability of the mind to acquire knowledge and understanding of thought, experience and sense. Learning abilities and memory integrity is controlled by hippocampus part of the brain. A major consequence of cognitive impairment is Alzheimer's disease which is among the major causes of mortality worldwide. It has been postulated that by 2050, there will be nearly a million new cases of Alzheimer's Disease per year. Cognitive impairment is caused by oxidative stress, excessive degradation of acetylcholine enzyme and gene mutations among others. Inhibitors of cholinesterase such as donepezil have been used to manage Alzheimer's disease however, they have side effects. Hence, a need for alternative medicines. In this study, the activity of aqueous leaf extracts of *Vigna unguiculata* and *Amaranthus dubius* on cognitive impairment in ketamine-treated mice were investigated since they have been shown to possess antioxidant potency. Though, oxidative stress is associated with cognitive impairment, there is no scientific data on the cognitive enhancing abilities of these two plants hence this study. Passive avoidance task was utilized to assess the cognitive-improving activities of the extracts. The extract's effect on malondialdehyde profiles which is a marker for oxidative stress were investigated. Also, inhibitory effects of the extracts on acetylcholinesterase enzyme that metabolizes acetylcholine, a neurotransmitter were determined. Quantitative phytochemical analysis was done by liquid chromatography-mass spectrometry. Effects of the two extracts on passive avoidance task revealed their cognitive enhancing effects since mice treated with the extracts exhibited significantly longer step-through latency compared with the negative control mice. Additionally, some of the tested extract doses induced significantly higher step-through latency compared with the reference drug donepezil indicating that some of the extract doses had better cognitive enhancing effects than the convectional drug donepezil. Further, some of the extract treated mice showed statistically similar step-through latencies with the normal mice showing that those dose extracts were able to restore cognition to normal levels. The plant extracts showed remarkable results in lowering the Malondialdehyde levels to normal levels and more effectively than donepezil. Further, results for antiacetylcholinesterase activity showed the ability of the two plant extracts to enhance cognition by increasing the bioavailability of acetylcholine by effectively inhibiting acetylcholinesterase enzyme. Quantitative phytochemical analysis revealed the bioavailability of essential phytochemicals that had cognitive enhancing effects. Therefore, the present study validates the claim that *A. dubius* and *V. unguiculata* exhibit cognitive enhancing properties.