

ROLE OF GINKGO BILOBA IN MANGANESE-INDUCED COGNITIVE IMPAIRMENT IN ADULT MALE WISTAR RATS

Ovwere I.R, Awuhe M.F, Maku T, Owokoniran Y.E, Memudu A.E.

Department of Anatomy, Faculty of Basic Medical Sciences

Edo State University, Iyamho. Edo State Nigeria.

INTRODUCTION

Memory impairment and mood-related dysfunctions are hallmarks of neurodegenerative conditions such as Alzheimer’s disease.

Exposure to heavy metals like manganese (MnSO₄) is associated with oxidative stress, neuroinflammation, and synaptic dysfunction that accelerate cognitive decline.

Ginkgo biloba, have attracted scientific attention linked to its antioxidant, anti-inflammatory, and cognition-enhancing activities.

This study was designed to ascertain the neurocognitive enhancing role of *Ginkgo biloba* leaf extract in manganese-induced memory impairment in a rat model.

MATERIALS AND METHODOLOGY

Twenty-four adult Male Wistar rats were randomly divided into four groups;

Group A the control, **Group B** received 5mg/kg MnSO₄ orally for 4 days, **Group C** received 200mg/kg of Ginkgo biloba orally for 10 days, and **Group D** received 5mg/kg MnSO₄ plus 200mg/kg *Ginkgo biloba* for 14 days.

Behavioral assessments for spatial memory and spontaneous alternation behavior (T Maze), Tail suspension test for anxiety behaviour. Brain homogenates was assayed for neuroinflammatory cytokines, lipid peroxidation, antioxidant enzymes (superoxide dismutase, catalase) and neurotransmitter (acetylcholine, dopamine and serotonin).

RESULT AND DISCUSSION

Ginkgo biloba treatment ameliorates manganese induced elevation in neuroinflammatory cytokines (TNF alpha, Interleukin 6), lipid peroxidation (Malondialhyde) and immobility time through increasing antioxidant enzyme status and increase neurotransmitter enzymes (acetylcholine, serotonin and dopamine) results in an improved spontaneous alternation behaviour and increased immobility time.

RESULT AND DISCUSSION

Ginkgo biloba treatment ameliorates manganese induced elevation in neuroinflammatory cytokines (TNF alpha, Interleukin 6), lipid peroxidation (Malondialhyde) and immobility time through increasing antioxidant enzyme status and increase neurotransmitter enzymes (acetylcholine, serotonin and dopamine) results in an improved spontaneous alternation behaviour and increased immobility time.

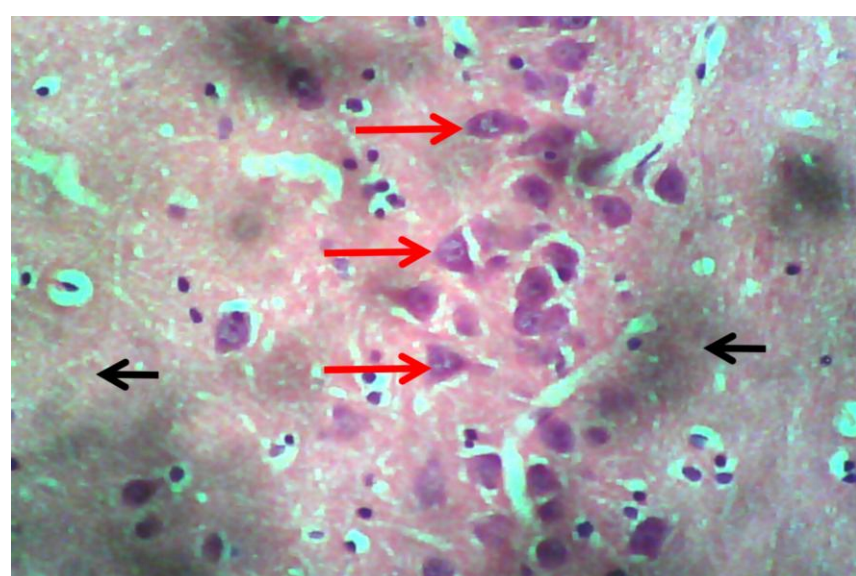


Figure 1.H&E-stained CA1 of the Hippocampus of the control showing pyramidal neurons with centrally nucleus in a moderately dense neuropil.

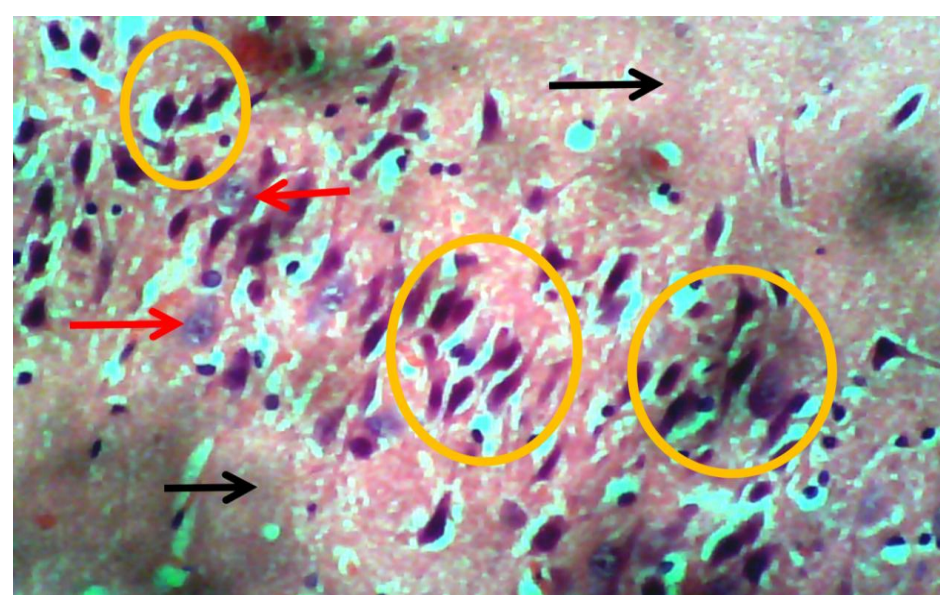


Figure 2.H&E-stained CA1 horn of the Hippocampus of Group B treated with 5mg/kg of MnSO₄ for 4 days showing the presence of degenerated pyramidal neurons within a sparsely dense neuropil.

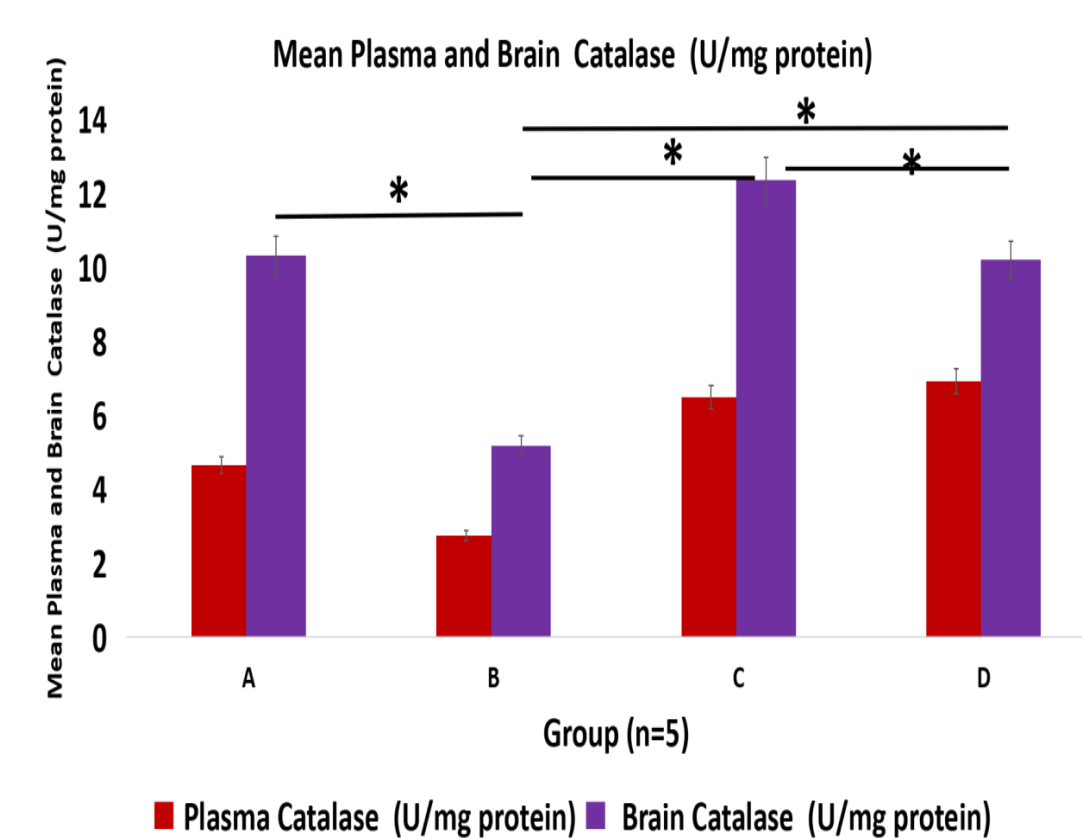


Figure 3: Graphical Representation for Antioxidant Enzyme Activities Mean Plasma and Brain Catalase (CAT)

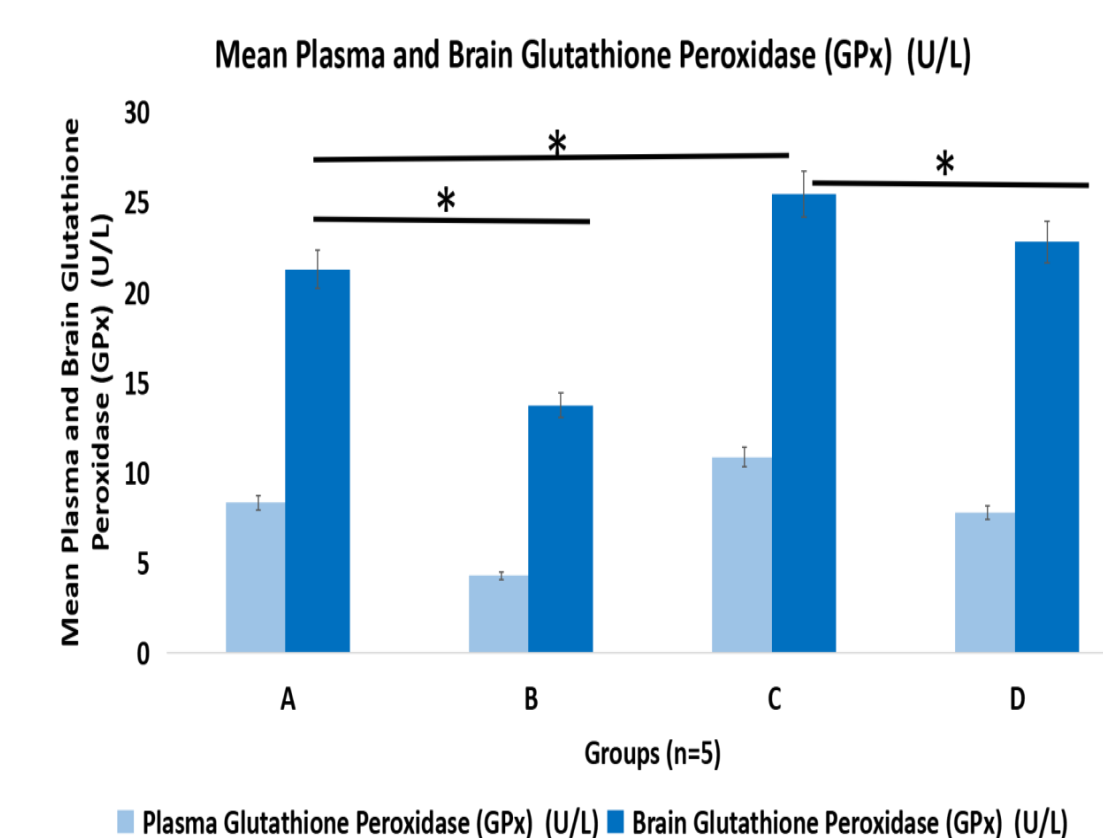


Figure 4: Graphical Representation for Antioxidant Enzyme Activities Mean Plasma and Brain Glutathione Peroxidase (GPX)

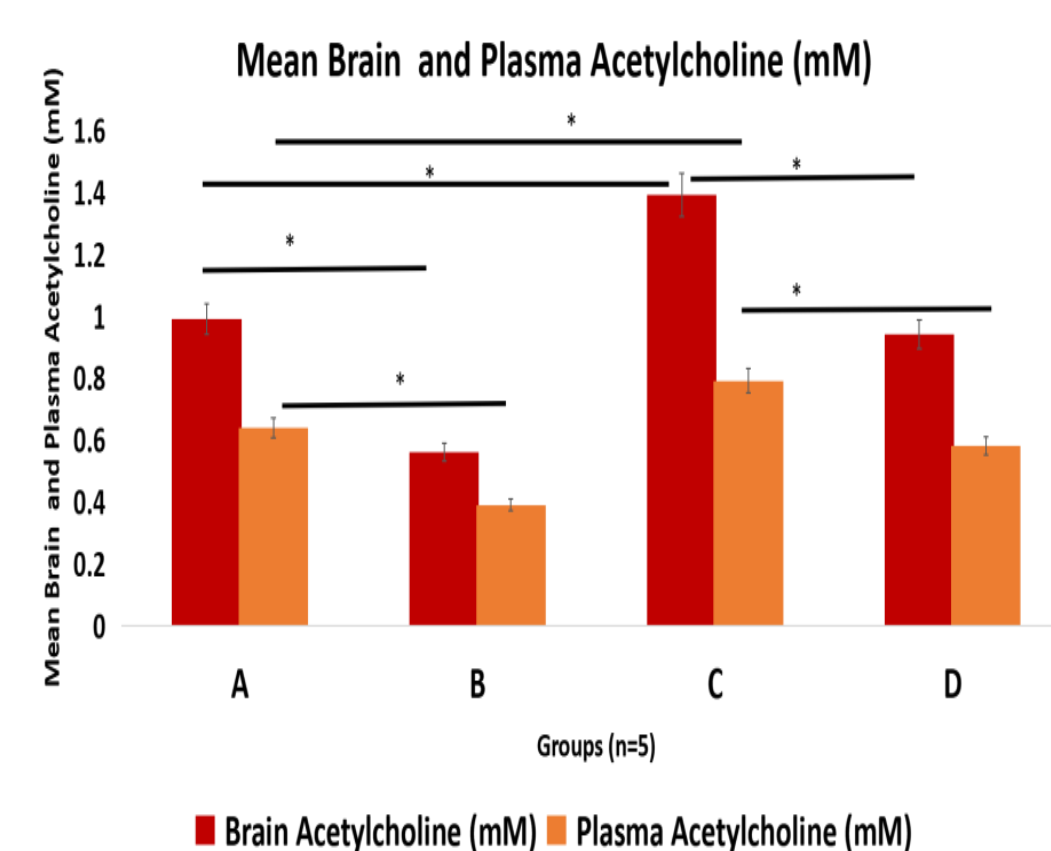


Figure 5: Graphical representation of Biochemical Enzyme Assay for the mean of Brain and Plasma Acetylcholine

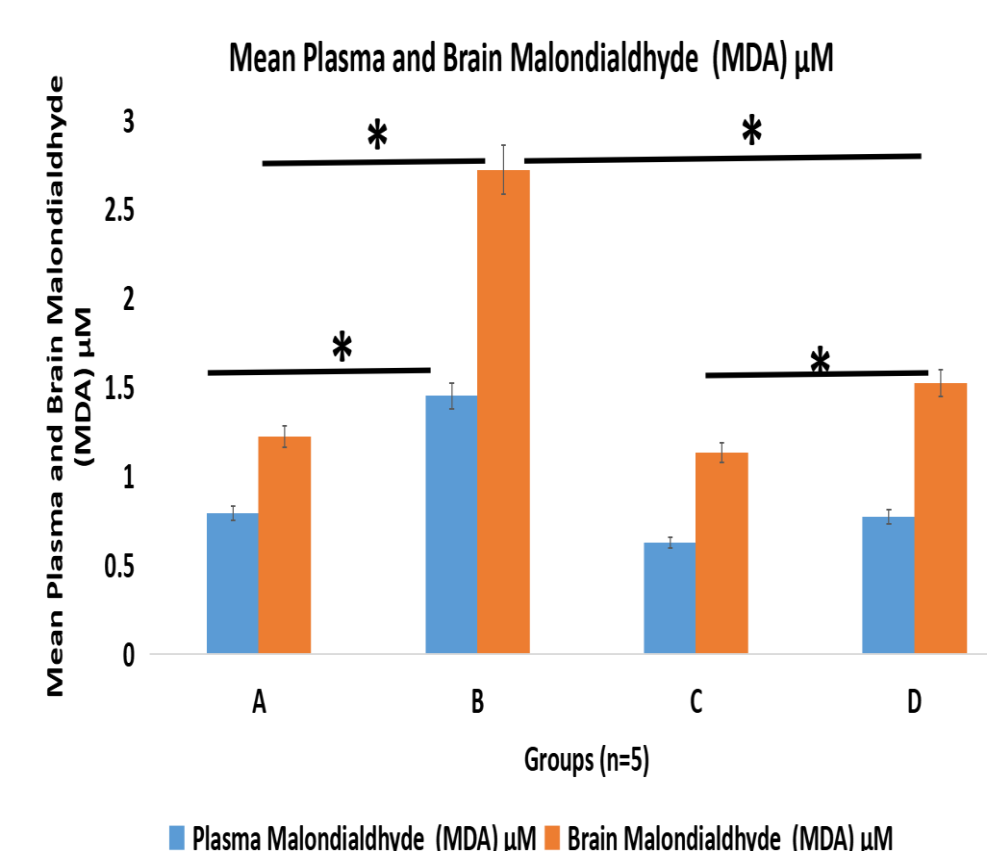


Figure 6: Graphical Representation of Mean Brain Homogenate Malondialdehyde (MDA) and Total protein

CONCLUSION

Ginkgo biloba restores antioxidant, neurotransmitter levels, reduced neuroinflammation, while preserving neuronal integrity to improve cognitive behaviour in animal model of cognitive impairment using heavy metal-induced neurotoxicity.

Thereby highlighting possible mechanism of Ginkgo biloba to prevent cognitive decline associated with environmental toxins in Alzheimer’s disease.

For more information about our group, projects, interest and collaboration, kindly email osahon.itohan@edouniversity.edu.ng