

African Mesquite Exerts Neuroprotective Activity Against Quaternary Metal Mixture -Induced Olfactory Bulb-Hippocampal Oxido-Inflammatory Stress via NRF2-HMOX-1-TNF-Alpha Pathway Pathway

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Abstract : African mesquite has been recognized for its antimicrobial, anti-inflammatory, and potential anticarcinogenic activities. However, its neuroprotective benefits against heavy metal-induced neurotoxicity remain largely unexplored. Therefore, the objective of this study was to investigate the neuroprotective properties of African mesquite in the hippocampus and olfactory bulb against common environmental pollutants, including Cd, As, Hg, and Pb. Thirty-five albino Sprague Dawley rats were divided into five groups for the experiment. Group 1 served as the control and did not receive either the heavy metal mixture (HMM) or African mesquite. Group 2 was orally administered HMM, consisting of PbCl₂ (20 mg/kg), CdCl₂ (1.61 mg/kg), HgCl₂ (0.40 mg/kg), and NaAsO₃ (10 mg/kg), for 960 days. Meanwhile, groups 3, 4, and 5 were treated with HMM along with African mesquite at doses of 500 mg/kg, 1000 mg/kg, and 1500 mg/kg, respectively. African mesquite reduced heavy metal accumulation in the hippocampus and olfactory bulb. Additionally, Sprague Dawley rats exhibited improved performance in the Passive avoidance and Cincinnati Maze tests. Furthermore, treatment with African mesquite significantly alleviated inflammation macromolecules peroxidation. It also restored the concentrations of SOD, CAT, GSH, GPx, Hmox-1, and reduced the activity of AChE, NRF2 and NFkB and improved histopathological findings. African mesquite exhibits a multifaceted neuroprotective effect with the potential to mitigate various aspects of heavy metal-induced neurotoxicity.

Keywords : African mesquite, heavy metal mixture, neurotoxicity, chemoprevention

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