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Hibiscus sabdariffa calyx extract alters inflammatory cytokines, oxidative stress biomarkers and hematological parameters in paradoxically sleep-deprived adult female Wistar rats

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Sleep deprivation negatively impacts well-being including increased stress levels, reduced cognitive performance and weakened immune systems. Twenty five female Wistar rats weighing 150–200 g were split into five groups of five rats each. Group I served as the normal control, while Group II was the negative control (sleep-deprived untreated). Groups III, IV, and V were administered varying doses of the HS extract via gavage at 100, 200 and 400 mg/kg respectively. The animals were anaesthetized and sacrificed, and blood samples were collected for biochemical assessment. HS notably reduced oxidative stress ($P< 0.05$) by improving the activities of key enzymatic antioxidants, including SOD, GPx, and CAT, while lowering ROS production in comparison to the SD-untreated group. Additionally, HS treatment led to a significant increase ($P< 0.05$) in the levels of interleukin-10 (IL-10) and brain-derived neurotrophic factor (BDNF), alongside a marked decrease in TNF-alpha levels when compared to the SD-untreated groups. The study demonstrated that HS treatment significantly ($P< 0.05$) improved hematological indices. In conclusion, HS extract modulates oxidative stress and inflammation via its effect on key antioxidant enzymes; SOD, GPx and CAT, inflammatory biomarkers; IL-10 and TNF-alpha as well as BDNF. It also improves hematological indices in female sleep-deprived animals.

Keywords: *Hibiscus sabdariffa*; Reactive oxygen species; Interleukin-10, Tumor necrosis factor alpha; Brain-derived neurotrophic factor; Sleep-deprived