

Chemical Profiling of *Hymenocardia acida* Stem Bark Extract and Modulation of Selected Antioxidant and Esterase Enzymes in Kidney and Heart of Wistar Rats

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Abstract : *Hymenocardia acida* belongs to the genus, *Hymenocardiaceae*, which is widely distributed in Africa. Both the leaf and stem bark of the plant have been used in the treatment of several diseases. The present study examined the chemical constituents of the *H. acida* stem bark extract (HASBE) and its effects on some antioxidant indices and esterase enzymes in female Wistar rats. The HASBE was obtained by Soxhlet extraction using methanol and then subjected to Atomic Absorption Spectroscopy (AAS) for elemental analysis, and Fourier-Transform Infrared (FT-IR) spectroscopy, ultraviolet (UV) spectroscopy, for functional group analysis, while High-performance liquid chromatography (HPLC), and Gas Chromatography-Flame ionization detection (GC-FID) were carried out for compound identification. Forty-eight female Wistar rats were assigned into eight groups of six rats each and separately administered orally with normal saline (Control), 50, 100, 150, 200, 250, 300, 350 mg/kg of HASBE twice per week for eight weeks. The rats were sacrificed under chloroform anesthesia, and kidneys and heart were excised and processed to obtain homogenates. The levels of superoxide dismutase (SOD), catalase, Malondialdehyde (MDA), glutathione peroxidase (GPx), acetylcholinesterase (AChE), and carboxylesterase (CE) were determined spectrophotometrically. The AAS of HASBE shows the presence of eight elements, including Cobalt (0.303), Copper (0.222), Zinc (0.137), Iron (2.027), Nickel (1.304), Chromium (0.313), Manganese (0.213), and Magnesium (0.337 ppm). The FT-IR result of HASBE shows four peaks at 2961.4, 2926.0, 1056.7, and 1034.3 cm^{-1} , while UV analysis shows a maximum absorbance (0.522) at 205 nm. The HPLC spectrum of HASBE indicates the presence of four major compounds, including orientin (77%), β -sitosterol (6.58%), rutin (5.02%), and betulinic acid (3.33%), while GC-FID result shows five major compounds, including rutin (53.27%), orientin (13.06%) and stigmasterol (11.73%), hymenocardine (6.43%) and homopterocarpin (5.29%). The SOD activity was significantly ($p < 0.05$) lowered in the kidney but elevated in the heart, while catalase was elevated in both organs relative to control rats. The GPx activity was significantly elevated only in the kidney, while MDA was not significantly ($p > 0.05$) affected in the two organs compared with controls. The activity of AChE was significantly elevated in both organs, while CE activity was elevated only in the kidney relative to control rats. The present study reveals that *Hymenocardia acida* stem bark extract majorly contains orientin, rutin, stigmasterol, hymenocardine, β -sitosterol, homopterocarpin, and betulinic acid. In addition, these compounds could possibly enhance redox status and esterase activities in the kidney and heart of Wistar rats.

Keywords : *Hymenocardia acida*, elemental analysis, compounds identification, redox status, organs

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