Nitrate-Induced Biochemical and Histopathological Changes in the Kidney of Rats: Attenuation by Hyparrhenia hirta

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Abstract : The present study investigated the protective role of Hyparrhenia hirta against sodium nitrate (NaNO3)-induced nephrotoxicity. A high-performance liquid chromatography coupled with a mass spectrometer (HPLC-MS) method was developed to separate and identify flavonoids in Hyparrhenia hirta. Seven flavonoids were identified as 3-O-methylquercetin, luteolin-7-O-glucoside, luteolin, apigenin-7-O-glucoside, apigenin-8-C-glucoside, luteolin-8-C-glucoside and luteolin-6-C-glucoside. Wistar rats were randomly divided into three groups: a control group and two treated groups during 50 days with NaNO3 administered either alone in drinking water or co-administered with Hyparrhenia hirta. NaNO3 treatment induced a significant increase in plasma levels of creatinine, urea and uric while urinary level decreased significantly. Nephrotoxicity induced by NaNO3 was characterized by significant increase in creatinine clearance. In parallel, a significant increase in malondialdehyde level along with a concomitant decrease in total glutathione content and superoxide dismutase, catalase and glutathione peroxidase activities were observed in the kidney after NaNO3 treatment. The histopathological changes in kidney after NaNO3 administration were shrunken. There were renal tubule cell degeneration and infiltration of mononuclear cells. Most glomeruli revealed shrinkage, a wide capsular space and a peri-glomerular mononuclear cells infiltration. Hyparrhenia hirta supplementation showed a remarkable amelioration of the abnormalities cited above. The results concluded that the treatment with Hyparrhenia hirta had a significant role in protecting the animals from nitrate-induced kidney dysfunction.

Keywords : flavonoids, hyparrhenia hirta, kidney, nitrate toxicity, oxidative stress, rat
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