Hematological, biochemical, histopathological and 1H-NMR metabolomics application in acute toxicity evaluation of clinacanthus nutans water leaf extract

ABSTRACT

The present study aims for the first time to provide the in vivo acute toxicological profile of the highest dose of Clinacanthus nutans (Burm. f.) Lindau water leaf extract according to the Organization for economic co-operation and development (OECD) 423 guidelines through conventional toxicity and advanced proton nuclear magnetic resonance (1H-NMR) serum and urinary metabolomics evaluation methods. A single dose of 5000 mg/kg bw of C. nutans water extract was administered to Sprague Dawley rats, and they were observed for 14 days. Conventional toxicity evaluation methods (physical observation, body and organ weight, food and water consumption, hematology, biochemical testing and histopathological analysis) suggested no abnormal toxicity signs. Serum 1H-NMR metabolome revealed no significant metabolic difference between untreated and treated groups. Urinary 1H-NMR analysis, on the other hand, revealed alteration in carbohydrate metabolism, energy metabolism and amino acid metabolism in extract-treated rats after 2 h of extract administration, but the metabolic expression collected after 24 h and at Day 5, Day 10 and Day 15 indicated that the extract-treated rats did not accumulate any toxicity biomarkers. Importantly, the outcomes further suggest that single oral administration of up to 5000 mg/kg bw of C. nutans water leaf extract is safe for consumption.

Keyword: Clinacanthus nutans; Medicinal plant; Biochemical test; Histopathology; Urinary metabolomics; Toxicity; 1H-NMR metabolomics; Metabolic pathway