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Preliminary phytochemical screening, in vitro antidiabetic, antioxidant activities, and toxicity of leaf extracts of Psychotria malayana Jack

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Abstract

Psychotria malayana Jack belongs to the Rubiacea and is widespread in Southeast Asian countries. It is traditionally used to treat diabetes. Despite its potential medicinal use, scientific proof of this pharmacological action and the toxic effect of this plant are still lacking. Hence, this study aimed to investigate the in vitro antidiabetic and antioxidant activities , toxicity , and preliminary phytochemical screening of P. malayana leaf extracts by gas chromatography-mass spectrome-try (GC-MS) after derivatization. The antidiabetic activities of different extracts of this plant were investigated through alpha-glucosidase inhibitory (AGI) and 2-NBDG glucose uptake using 3T3-L1 cell line assays, while the antioxidant activity was evaluated using DPPH and FRAP assays. Its toxicological effect was investigated using the zebrafish embryo/larvae (Danio rerio) model. The mor-tality, hatchability, tail-detachment, yolk size, eye size, beat per minute (BPM), and body length were taken into account to observe the teratogenicity in all zebrafish embryos exposed to methanol extract . The LC50 was determined using probit analysis. The methanol extract showed the AGI activity (IC50 = 2.71 ± 0.11 μg/mL), insulin-sensitizing activity (at a concentration of 5 μg/mL), and potent antioxidant activities (IC50 = 10.85 μg/mL and 72.53 mg AAE/g for DPPH and FRAP activity , respectively). Similarly, the water extract exhibited AGI activity (IC50 = 6.75 μg/mL), insulin-sensi-tizing activity at the concentration of 10 μg/mL, and antioxidant activities (IC50 = 27.12 and 33.71 μg/mL for DPPH and FRAP activity , respectively). The methanol and water extracts exhibited the LC50 value higher than their therapeutic concentration, i.e., 37.50 and 252.45 μg/mL, respectively. These results indicate that both water and methanol extracts are safe and potentially an antidiabetic agent, but the former is preferable since its therapeutic index (LC50/therapeutic concentration) is much higher than for methanol extracts . Analysis using GC-MS on derivatized methanol and water extracts of P. malayana leaves detected partial information on some constituents including palmitic acid, 1,3,5-benzenetriol, 1-monopalmitin, beta-tocopherol, 24-epicampesterol, alpha-tocopherol, and stigmast-5-ene, that could be a potential target to further investigate the antidiabetic properties of the plant. Nevertheless, isolation and identification of the bioactive compounds are required to confirm their antidiabetic activity and toxicity . © 2021 by the authors. Licensee MDPI, Basel, Switzerland.

Author keywords

Antidiabetic activity ; Antioxidant activity ; Derivatization; GC-MS; Psychotria malayana Jack ; Toxicity

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