

Evaluation of Antioxidant, Antidiabetic, Anti-obesity Properties and Cytotoxicity Effect of Four Sri Lankan Medicinal Plants

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With the global rise in non-communicable diseases such as diabetes, obesity, and related metabolic disorders, there is an increasing demand for sustainable, low-toxicity therapeutic alternatives derived from natural sources. Sri Lankan medicinal plants offer promising bioactive compounds, yet scientific validation is crucial for their integration into modern healthcare. This study aimed to evaluate the antioxidant, antidiabetic, anti-obesity, and cytotoxic properties of leaf extracts from four selected Sri Lankan medicinal plants, namely, *Ricinus communis* L., *Croton aromaticus* L., *Toddalia asiatica* (L.) Lam., and *Sida rhombifolia* L. selected based on ethnobotanical relevance and traditional use in metabolic disorders. Extracts were prepared using hexane, dichloromethane, ethanol, and water to ensure a broad polarity range for compound solubility. The antioxidant activity was assessed employing assays for DPPH radical scavenging activity, ferric reducing antioxidant power (FRAP), total flavonoid content (TFC), and total phenolic content (TPC). Antidiabetic and anti-obesity activities were assessed using α -amylase and lipase inhibition assays, respectively, while cytotoxicity was evaluated using the brine shrimp lethality bioassay. Among the tested extracts, *Ricinus communis* L. exhibited the highest antioxidant activity with DPPH (0.531 ± 0.003 mg TE/g, dw), FRAP (2.726 ± 0.025 mg Fe²⁺/g, dw). Highest TPC, and TFC values were also resulted from *Ricinus communis* L. In antidiabetic evaluation, *Sida rhombifolia* L. showed the highest α -amylase inhibition in ethanol extract ($IC_{50} = 0.89$ μ g/mL) while *Toddalia asiatica* (L.) Lam displayed a significant activity in hexane and water extracts. According to the lipase inhibition assay, *Sida rhombifolia* L. (hexane: $IC_{50} = 4.08$ μ g/mL) and *Toddalia asiatica* L. (water: $IC_{50} = 4.51$ μ g/mL) demonstrated a strong anti-obesity potential. The brine shrimp lethality assay revealed a high toxicity in *Croton aromaticus* L. ($LC_{50} < 50$ μ g/mL), whereas *Toddalia asiatica* (L.) Lam and *Ricinus communis* L. were non-toxic ($LC_{50} > 4000$ μ g/mL), supporting their therapeutic safety. The study highlights the potential of selected plant extracts as natural antioxidants and enzyme inhibitors, supporting their use in health promotion, functional foods, and preventive therapeutics for sustainable healthcare and advancing global health research through scientific collaboration.

Keywords: Medicinal plants, antioxidant, antidiabetic, anti-obesity, cytotoxicity