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Screening of *In vitro* Antidiabetic and Antioxidant Activities of Selected Sri Lankan Medicinal Plants

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Abstract

Sri Lanka is renowned for its rich biodiversity of medicinal plants that have been used in traditional medicine to manage diabetes and oxidative stress. Determining the antidiabetic and antioxidant properties of these medicinal plants offers a novel, accessible, affordable and natural alternative to synthetic drugs. This research also highlights utilizing natural resources for human benefit and sustainable resource management. By reducing use of synthetic drugs, we can minimize the associated environmental costs, such as pollution from manufacturing processes and disposal of pharmaceutical waste. The study investigated the antidiabetic and antioxidant properties of five Sri Lankan medicinal plants: young leaves of Jack (*Artocarpus heterophyllus* Lam.), Little King Bitter (*Andrographis paniculata* (Burm.f.) Nees), Ivy gourd (*Coccinia grandis* (L.) Voigt), Cluster fig (*Ficus racemosa* L.) and flowers of Aloe vera (*Aloe barbadensis* Mill.). Total phenolic content and flavonoid content were determined using standard TPC and TFC assays, respectively. Antioxidant activity was assessed by DPPH and FRAP assays, while alpha-amylase and alpha-glucosidase inhibition assays evaluated the antidiabetic potential. Jack young leaves exhibited the highest TPC (54.225±0.754 mg GAE/g) and TFC (18.3402±0.1384mg QE/g), suggesting strong antioxidant potential. Cluster fig displayed the highest FRAP value (23.836±1.133 mg TE/g). Jack and Ivy gourd extracts underwent further analysis. Jack young leaves showed a lower IC50 value (236.636±0.44 ppm) in the DPPH assay compared to Ivy gourd (337.649±1.456 ppm), indicating superior free radical scavenging activity. Conversely, Ivy gourd leaves displayed the strongest alpha-amylase inhibition (IC50=9.145±0.0485 ppm), while Jackfruit leaves exhibited the strongest alpha-glucosidase inhibition (IC50=1.49367±0.00379 ppm). These findings suggest all five plants treated in this study possess varying antidiabetic and antioxidant properties. Jackfruit leaves emerged as particularly promising, demonstrating the most potent free radical scavenging activity and glucosidase inhibition. Further research is needed to explore the mechanisms underlying and validate their potential use for diabetes and oxidative stress management.

Keywords: *Natural, Diabetic, Herbal, Inhibition, Pharmaceutical*