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Determination of bioactivity potential of Acronychia pedunculata, Alpinia calcarata Roscoe, and Bacopa monnieri grown in Sri Lanka

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Medicinal plants have increasingly gained attention for their plethora of pharmacological effects owing to the presence of bioactive compounds and employed in herbal healthcare practices. This study investigated three selected medicinal plants grown in Sri Lanka in vitro to assess their bioactive compounds, antioxidative, anti-hyperglycemic, anti-obesity properties, and plant extract toxicity. Dried powdered samples of medicinal plants, namely Acronychia pedunculata, Alpinia calcarata Roscoe, and Bacopa monnieri, were extracted with 100% methanol via ultrasonication, followed by evaporation to obtain crude extracts. The extracts were evaluated for their total phenolic content (TPC), total flavonoid content (TFC), ferricreducing antioxidant power (FRAP), DPPH radical scavenging activity, α -amylase, α glucosidase, lipase inhibitory activities, and brine shrimp lethality using standard assays. Among plant extracts, A. pedunculata possessed the highest TPC ($69.07 \pm 4.35 \text{ mg GAE/g}$) and *B.monnieri* possessed the highest TFC $(1.39 \pm 0.085 \text{ mg CE/g})$ values. Furthermore, *B.monnieri* exhibited the highest activity in the FRAP assay (2259.1 \pm 73.5 mmol FeSO₄/g) which was lower than the positive control trolox (13447.00 \pm 19.80 mmol FeSO4/g). In the DPPH radical scavenging assay also, the extract showed the highest activity ¹among the extracts with an IC₅₀ value of 484.5 \pm 22.6 mgL⁻¹. However, it was higher than the positive control ascorbic acid (IC₅₀ = $3.46 \pm 0.45 \text{ mgL}^{-1}$). Furthermore, *A.pedunculata* exhibited potential inhibitory activity against α -amylase. The IC₅₀ value obtained for A. pedunculata was $592.1 \pm 72.2 \text{ mgL}^{-1}$, which is significantly higher than the positive control acarbose, with an IC₅₀ of 8.51 \pm 0.67 mgL⁻¹. Two extracts showed significant α -glucosidase inhibitory activity at a concentration of 1000 mgL⁻¹, in which the A.pedunculata extract showed 57% inhibition and A.calcarata extract showed 56% inhibition, respectively. None of the extracts showed lipase inhibitory activity or brine shrimp lethality. Based on these findings, all three medicinal plants studied have the potential to be developed as ingredients in functional food and as alternative remedies for managing non-communicable diseases.

Keywords: Antioxidant activity, bioactivities, medicinal plants