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Comparative Analysis of Physiochemical Properties and In Vitro Antioxidant Potency Among Morphotypes of *Centella asiatica* Grown in Sri Lanka

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Abstract

Centella asiatica commonly referred as Gotukola, is recognized for its extensive application in traditional medicine owing to its remarkable health benefits. This study investigated the differences in pH, ash content, moisture content, and *in vitro* antioxidant potential among three prevalent vine-type morphotypes of *C. asiatica*: Wel Gotukola, Meerigima Gotukola, and Yodha Gotukola, indigenous to Sri Lanka. *C. asiatica* plants of the same age (100 days) at their first harvestable matured stage, were randomly collected from domestic gardens in Gampaha District, Sri Lanka. Three replicates of each morphotype were sampled. Moisture and ash content were analysed using the standard AOAC method, and pH was measured using the potentiometric method. DPPH (2,2-Diphenyl-1-picrylhydrazyl) radical scavenging capacity assay was used to determine the antioxidant activity. To thoroughly compare antioxidant potential among morphotypes, the ANOVA test was utilized followed by post-hoc Tukey HSD tests. Following results were obtained for the average moisture content of Wel Gotukola (83.41%±1.16%), Yodha Gotukola (74.33%±2.23%), and Meerigama Gotukola (79.46%±1.89%), alongside average ash content of Wel Gotukola (11.60%±1.02%), Yodha Gotukola (13.12%±2.57%), and Meerigama Gotukola (12.17%±2.01%). Additionally, an average pH of Wel Gotukola (6.00±0.21), Yodha Gotukola (5.75±0.25), and Meerigama Gotukola (5.98±0.14) was observed. The antioxidant activity of *C. asiatica* extracts exhibited concentration dependent increases in radical scavenging capacity. Notably, the DPPH radical scavenging potency, denoted by the minimum IC₅₀ value, exhibited significant variations across different Gotukola varieties (p<0.05): Wel Gotukola (6.4 ± 0.54 µg/mL), Yodha Gotukola (8.56±0.35 µg/mL), and Meerigama Gotukola (7.0±0.75 µg/mL). Post-hoc Tukey tests showed antioxidant activity was significantly higher in Wel Gotukola compared to that of Meerigama and Yodha Gotukola morphotypes (p<0.05). Furthermore, Wel Gotukola demonstrated the highest average pH, moisture content, and the lowest mineral content. Conversely, Yodha Gotukola exhibited the lowest pH, moisture content, and the highest ash content. These findings underscore the potential of chemical parameters in elucidating the distinctive attributes of the three Gotukola varieties. Specifically, the significantly higher antioxidant potential observed in Wel Gotukola suggests its potential as an optimal candidate for herbal product development. This study imparts valuable insights into optimizing the therapeutic efficacy of formulations based on the specific *C. asiatica* employed in such endeavours.

Keywords: Antioxidant activity, *Centella asiatica*, Morphotypes, Proximate analysis