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COMPARATIVE ANALYSIS OF ANTIOXIDANTS PRESENT IN AERIAL VS. ROOT PARTS OF CYPERUS ROTUNDUS ACROSS DIFFERENTIAL GEOGRAPHICAL LOCATIONS IN SRI LANKA

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Introduction: Cyperus rotundus (Nutgrass) is a widespread tropical perennial sedge used to treat various medical conditions in traditional medicine, including bleeding, inflammation, and diarrhea, due to its potent antioxidant properties. However, the variations in its phytochemical components and bioactivity across different plant parts, geographical locations of different extraction procedures are insufficiently studied.

Objectives: The aim of this study was to compare the antioxidant activity in different extraction methods of aerial and root sections of C. rotundus across three different geographical regions in Sri Lanka:.Anuradhapura, Diyathalawa, and Kuliyapitiya.

Methodology: Healthy and undamaged C. rotundus samples were authenticated by the National Herbarium of Peradeniya. The aerial and root samples of C. rotundus were carefully cleaned, air-dried, and ground into fine powders. Both methanolic and hexane extractions were performed using sonication and rotary evaporation, and aqueous extraction was analyzed using hot water infusion and freeze-drying techniques. The samples were weighed and conducted under DPPH radical scavenging assay. All IC20, IC50, and IC80 values were statistically analyzed using GraphPad Prism 10 software.

Results: The aqueous aerial extracts from Diyathalawa (IC20 = 35.56 ± 4.43, IC50 = 126.92 ± 6.22, IC80 = 250.37 ± 9.02) had the highest antioxidant activity across all samples. Hexane extracts exhibited the least antioxidant activity, with IC20 values ranging from 113.80 ± 69.63 (Diyathalawa root) to 408.95 ± 155.23 (Anuradhapura root) with lacking IC50 and IC80 values. Whereas methanolic extracts showed moderate antioxidant potential, with IC50 values ranging from 143.56 ± 38.60 (Kuliyapitiya root) to 313.19 ± 17.57 (Anuradhapura aerial) and IC80 values ranging from 348.17 ± 34.49 (Kuliyapitiya root) to 810.24 ± 64.21 (Anuradhapura root), with lacking IC20 values. Overall, antioxidant activity was evaluated in the aqueous aerial > methanol aerial > hexane aerial > aqueous root > methanol root > hexane root, since aerial parts exhibited stronger antioxidant activity than aerial parts and Diyathalawa samples and aqueous aerial samples (IC50 range = 126.92 ± 38.60 to 237.36 ± 24.40) exhibited the highest antioxidant activity across plant parts and regions.

Conclusion: The study emphasised the significant influence of geographic variations, plant parts, and solvent polarity on C. rotundus antioxidant activity. Aqueous aerial extracts exhibit greater values, suggesting that the aerial components contain concentrated, strong polar antioxidants, which exhibit vitality of aerial sections and challenge traditional root extractions. However, further investigation into geographical influences, phytochemical composition is required to improve the plant's medicinal applications in both traditional and modern medicine.

Keywords: Cyperus rotundus, Antioxidant, Aerial and root extracts, Geographical location, Sri Lanka