

Exploring the Antioxidant Activity of *Ocimum tenuiflorum* from Different Geographical Regions

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Ocimum tenuiflorum, also known as Krishna Tulsi, is known for its diverse medicinal and spiritual attributes, many of which have been investigated. The antioxidant activity of medicinal plants is widely studied for their potential health benefits. However, these antioxidant properties may differ with geographical regions. This study aims to assess the antioxidant activity of *Ocimum tenuiflorum* collected at the same time from dry zone, wet zone, and intermediate zone which are three different geographical regions in Sri Lanka. To evaluate the invitro antioxidant activity of *Ocimum tenuiflorum* from the dry zone, wet zone, and intermediate zone. Whole plant samples of *Ocimum tenuiflorum* were collected at the same time from three different geographical areas. Plant samples were authenticated by the Botany Division, Bandaranayake Memorial Ayurvedic Research Institute, Nawinna, Maharagama. Methanolic Plant extracts were prepared from the whole plant of *Ocimum tenuiflorum* using the maceration method. Antioxidant activity was assessed using 2,2-Diphenyl-1-picrylhydrazyl (DPPH) and ferric-reducing antioxidant power (FRAP - Oyaizu method) assays. Absorbance readings were obtained from the spectrophotometer. Statistical analysis was performed using one-way ANOVA in GraphPad Prism based on triplicate % inhibition values at 50 µg/mL (for DPPH) and triplicate absorbance readings at 50 µg/mL (for FRAP) to assess significance across geographical regions. Both DPPH and FRAP assays revealed a notable geographical variation in antioxidant activity. The wet zone extract showed the highest antioxidant activity (DPPH: IC₅₀ 19.90 µg/mL) followed by the intermediate zone (DPPH: IC₅₀ 30.06 µg/mL) and the dry zone extract showed the lowest activity (DPPH: IC₅₀ 470.3 µg/mL). Ascorbic acid showed the highest antioxidant activity (DPPH: IC₅₀ 2.228 µg/mL). Statistical analysis indicated that there is a significant difference in antioxidant activity between the regions for DPPH (p=0.0004). For the FRAP assay, while differences in reducing power were observed, they were not statistically significant (p=0.1796). This study indicates a significant variation in the antioxidant activity of *Ocimum tenuiflorum* based on geographical origin with the wet zone extracts showing the highest antioxidant activity. The results indicate environmental factors may influence the therapeutic potential of *Ocimum tenuiflorum*.

Keywords: Antioxidant, geographical variation, DPPH assay, *Ocimum tenuiflorum*