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Phytochemical Profiling and Antioxidant Potential of Selected Wild Medicinal Plants from the Himalayan Region

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Abstract: ***Background:*** *The Himalayan region is one of the richest reservoirs of medicinal plant biodiversity and has supported traditional healthcare systems for thousands of years. Indigenous communities in this region rely extensively on wild medicinal plants for primary healthcare, while these plants also serve as important raw materials for pharmaceutical, nutraceutical, and traditional medicine industries worldwide.*

Objective: *The present study was undertaken to evaluate the phytochemical composition and antioxidant activity of selected wild medicinal plants native to the Himalayan ranges of India, China, Nepal, Bhutan, and Pakistan.*

Methods: *Twenty medicinal plant species, including Swertia bimaculata, Ficus neriifolia, Rubus treutleri, Periploca calophylla, Buddleja napaulensis, Habenaria edgeworthii, Pyracantha crenulata, Roscoea procera, Allium rubellum, Berberis chitria, Capsella bursa-pastoris, Artemisia maritima, Juniperus macropoda, Origanum vulgare, Valeriana jatamansi, Polygonatum verticillatum, Meconopsis aculeata, and Fragaria nubicola, were analyzed. Different plant parts were examined for total polyphenols, flavonoids, alkaloids, saponins, and tannins using standard phytochemical assays. Antioxidant capacity was assessed employing DPPH radical scavenging and ferric reducing antioxidant power (FRAP) assays. High-performance liquid chromatography (HPLC) was used for rapid screening and identification of bioactive compounds in potent extracts.*

Results: *The phytochemical screening revealed considerable variation in bioactive compound content among species as well as among different plant parts. Certain fractions exhibited significantly higher concentrations of polyphenols, flavonoids, alkaloids, saponins, and tannins, which corresponded to enhanced antioxidant activity. A strong association was observed between phytochemical content and antioxidant capacity as determined by DPPH and FRAP assays. HPLC analysis supported the presence of multiple antioxidant-related compounds, enabling efficient identification of bioactive constituents.*

Conclusion*: The study demonstrates that Himalayan wild medicinal plants are valuable sources of natural antioxidants and phytochemicals with therapeutic potential. These findings provide scientific validation for the traditional use of these species and highlight the importance of their conservation and sustainable utilization for future pharmaceutical and functional food applications.*

Key Words: Medicinal plants; Himalayan region; Antioxidant activity; Phytochemicals; HPLC

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