Title : Quantitative Comparison on Antioxidants, Bioactive Compounds and Scanning for Phytochemicals via LC-QTOF/MS of Three Lamiaceae Species

Author(s) : **1.** Narawin Puntala **Student ID :** 650510057

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Advisor(s) : **1.** Associate Professor Dr. Lalida Shank

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ABSTRACT

Herbal plants have long played a vital role in health care systems and are essential components in modern medical science, particularly plants in the Lamiaceae family, which are economically significant and diverse. This study aimed to comparatively analyze the content of antioxidants and bioactive compounds including phenolic compounds and flavonoids of the three plant species within the same family: Indian Borage (*Coleus amboinicus* Lour), Perilla (*Perilla frutescens* (L.) Britton), and Korean Perilla (*Perilla frutescens* var. *crispa*). The samples were prepared in the form of fresh and dried prior to the extraction using 100% (v/v) ethanol. The antioxidant activities were examined by DPPH, FRAP, and ABTS methods. Additionally, total phenolic and flavonoid contents were compared using TPC and TFC. Furthermore, the LC-QTOF/MS technique was employed for the scanning of phytochemicals. Results indicated that the three plant species and different preparation methods significantly affected the content of antioxidants and bioactive compounds ($p < 0.05$) and affected the type and content of phytochemicals detected. Fresh *C. amboinicus* exhibited the highest total phenolic content (1.08 ± 0.03 mg GAE/g) and showed the most potent antioxidant activity across all assays (IC_{50} for DPPH = 143.71 µg/mL). While, drying of samples led to the decrease of the content of antioxidants and bioactive compounds in *C. amboinicus*. It conversely increased the total flavonoid content in Korean Perilla and Perilla, with dried Korean Perilla reaching the highest total flavonoid content (5.33 ±1.08 mg QE/g). Results from the screening via LC-QTOF/MS revealed that rosmarinic acid, apigenin, and caffeic acid were the primary constituents in fresh *C. amboinicus* and Korean Perilla. Meanwhile, the drying process led to the detection of new compound groups, such as kaempferol in *C. amboinicus*, and naringenin in Korean Perilla and Perilla. These findings demonstrate that fresh Indian Borage is a superior source of antioxidants and bioactive compounds. The optimal results from fresh samples can serve as a crucial database for further development in the pharmaceutical and functional food industries. Given its rich phytochemical profile, particularly its antimicrobial and therapeutic properties, Indian Borage shows great potential for application in natural preservative agents, wound healing treatments, and the formulation of health-promoting supplements.

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