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Comparative study of different extraction techniques on phytochemical extraction of *Eryngium foetidum* leaves

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Abstract

The isolation of desired active compounds from plant-based materials is largely dependent on the extraction method performed. As a result, the purpose of this work was to evaluate the different extraction techniques based on the phytochemicals and antioxidant capacity of *Eryngium foetidum* leaves. During the analysis, water was utilized as the solvent, four extraction approaches were used: sonication (E1, one hour, RT, 40 kHz), Soxhlet (E2, six hours, 105 °C), maceration with agitation (E3, six hours, RT, 1000 rpm), and maceration with agitation upon heating (E4, six hours, 60 °C, 1000 rpm). The extracts were concentrated using a freeze dryer, and the obtained crude powder was used for further analysis. Standard methods were used for phytochemical screenings and quantification of total phenolics content (TPC), total flavonoids content (TFC), total tannins content (TTC), terpenoids content (TC), saponins content (SC), and alkaloids content (AC), while FRAP and DPPH assays were used to evaluate antioxidant capacity. The results showed that *E. foetidum* contains a diverse array of phytochemicals, with the TPC, TTC, TC, and SC account presenting to be higher in the extraction process E4 (37.37 ± 0.65 mg GAE/g, 36.99 ± 0.64 mg TAE/g, 0.89 ± 0.01 mM LE/g and 185.84 ± 0.54 mg SE/g, respectively) and lower in the technique E1. TFC levels were high in E2 (11.84 ± 0.14 mg QE/g), but TFC levels were low in E3. Further, AC was determined to be greater in E3 (1.67 ± 0.01 mg AE/g) and lower in E2. Total antioxidant capacity by FRAP assay was higher in E4 (47.17 ± 0.20 mg Trolox Eq/g) and lower in E1. The DPPH radical scavenging assay IC50 value in E3 was low (12.91 ± 0.02 mg/ml), indicating significant scavenging activity than others. In conclusion, the extraction technique E4 is a suitable method to extract antioxidants and polyphenolics from *E. foetidum* leaves. Because the amount of phytochemicals and antioxidant capacity vary according on the extraction procedure, an extraction method that is appropriate for the application should be chosen.

Keywords: Antioxidants, Extraction methods, *Eryngium foetidum*, phytochemicals

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