PHYTOCHEMICAL ANALYSIS, ANTI-INFLAMMATORY, AND ANTIBACTERIAL ACTIVITIES OF DIFFERENT ORGANS OF *BUNIUM FERULACEUM* SM.

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Abstract. This study investigated the chemical composition and biological activities of hydro-methanolic extracts from the leaves, flowering heads, and tubers of *Bunium ferulaceum* Sm. Phytochemical analysis revealed high levels of phenolics (53.13 mg GAE/g), flavonoids (21.45 mg QE/g), and tannins (10.17 mg TAE/g) in the leaves, while the tubers contained the highest triterpene content (8.15 µg UAE/mg). The tuber extract exhibited strong anti-inflammatory activity, with IC_{50} values of 273.23 µg/mL for BSA denaturation and 684.33 µg/mL for hemolysis. In contrast, the leaf extract demonstrated significant antibacterial efficacy, with MIC values ranging from 0.75 to 11.9 mg/mL. Correlation analyses indicated that anti-inflammatory effects were strongly associated with triterpenes ($r = –0.97$), while antibacterial activity correlated with polyphenols, particularly phenolics and flavonoids ($r = –0.91$ and $–0.90$). These results provide a chemically grounded explanation for the observed bioactivities and demonstrate the biological potential of *B. ferulaceum* as a source of bioactive compounds for clinical and pharmaceutical applications, supporting its traditional use in Algerian medicine.

Keywords: *Bunium ferulaceum* Sm, phytochemical analysis, anti-inflammatory activity, antibacterial activity.