

The Evaluation of Antioxidant and Antimicrobial Activities of Essential Oil and Aqueous, Methanol, Ethanol, Ethyl Acetate and Acetone Extract of *Hypericum scabrum*

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Abstract : Herbal essential oil and extracts are a good source of natural antioxidants and antimicrobial compounds. *Hypericum* is one of the potential sources of these compounds. In this study, the antioxidant and antimicrobial activity of essential oil and aqueous, methanol, ethanol, ethyl acetate and acetone extract of *Hypericum scabrum* was assessed. Flowers of *Hypericum scabrum* were collected from the surrounding mountains of Hamadan province and after drying in the shade, the essential oil of the plant was extracted by Clevenger and water, methanol, ethanol, ethyl acetate and acetone extract was obtained by maceration method. Essential oil compounds were identified using the GC-Mass. The Folin-Ciocalteu and aluminum chloride (AlCl₃) colorimetric method was used to measure the amount of phenolic acid and flavonoids, respectively. Antioxidant activity was evaluated using DPPH and FRAP. The minimum inhibitory concentration (MIC) and the minimum bacterial/fungicide concentration (MBC/MFC) of essential oil and extracts were evaluated against *Staphylococcus aureus*, *Bacillus cereus*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Aspergillus flavus* and *Candida albicans*. The essential oil yield of was 0.35%, the lowest and highest extract yield was related to ethyl acetate and water extract. The most component of essential oil was α -Pinene (46.35%). The methanol extracts had the highest phenolic acid (95.65 \pm 4.72 μ g galic acid equivalent/g dry plant) and flavonoids (25.39 \pm 2.73 μ g quercetin equivalent/g dry plant). The percentage of DPPH radical inhibition showed positive correlation with concentrations of essential oil or extract. The methanol and ethanol extract had the highest DPPH radical inhibitory. Essential oil and extracts of *Hypericum* had antimicrobial activity against the microorganisms studied in this research. The MIC and MBC values for essential oils were in the range of 25-25.6 and 25-50 μ g/mL, respectively. For the extracts, these values were 1.5625-100 and 3.125-100 μ g/mL, respectively. Methanol extracts had the highest antimicrobial activity. Essential oil and extract of *Hypericum scabrum*, especially methanol extract, have proper antimicrobial and antioxidant activity, and it can be used to control the oxidation and inhibit the growth of pathogenic and spoilage microorganisms. In addition, it can be used as a substitute for synthetic antioxidant and antimicrobial compounds.

Keywords : antimicrobial, antioxidant, extract, hypericum

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