

Extract-rich in flavonoids from *Hibiscus sabdariffa* calyces: Optimizing microwave-assisted extraction method and characterization through LC-Q-TOF-MS analysis

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ABSTRACT

Hibiscus sabdariffa comprises calyx which is rich in flavonoids and numerous phytochemical compounds. Nevertheless, the extraction parameters can influence the recoveries of these bioactive compounds. It is then important to investigate the contributing effects of the process parameters and optimized their conditions to achieve higher recovery yield. Hence, this study was carried out to examine the contributing effects of microwave-assisted extraction (MAE) process factors (irradiation time, ethanol concentration, solvent/sample ratio, temperature, and microwave power) on the yield of total flavonoid (TF) contents from *H. sabdariffa* calyces using one-variable-at-a-time. The significant MAE process parameters were further optimized using Box Behnken design. At the MAE optimal conditions, the extract was analyzed to identify the flavonoid compounds using liquid chromatography-mass spectrometry quadrupole time of flight. An optimum TF content of 94.32 mg QE/g extract from *H. sabdariffa* calyces was obtained at the following MAE conditions: Irradiation time of 4 min; ethanol concentration of 52% vol/vol; microwave power of 450 W and solvent/sample ratio 15:1 ml/g. Moreover, 95 flavonoid compounds were tentatively identified in the extract at optimized MAE conditions. Thus, these flavonoids can be further isolated in future studies to unveil embedded potentials of *H. sabdariffa* calyx extract. **Practical application:** The procedure described the microwave-assisted extraction (MAE) which can serve as a guideline for extracting flavonoids from *Hibiscus sabdariffa* calyx. Moreover, the liquid chromatography-mass spectrometry quadrupole time of flight analysis provided the developed conditions for identifying flavonoids from the calyces. The results obtained suggested the exact MAE conditions to achieve an optimum yield of flavonoids from *H. sabdariffa* calyces. Most importantly, the tentatively identified flavonoids can further be isolated and purified in future studies to unveil the embedded biological potentials.

KEYWORDS

Bioactive compounds; Biological potential; Ethanol concentrations; Extraction parameters; Liquid chromatography - mass spectrometries; Microwave-assisted extraction; One variable at a time; Quadrupole-time of flights

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