Determination of Rosmarinic Acid and Caffeic Acid Contents in Herbal Tea Extracts

方佩珊、吳芳禎

E-mail: 9611988@mail.dyu.edu.tw

ABSTRACT

In this study, a high performance liquid chromatography (HPLC) method was developed to analyze two nature phenolic compounds, rosmarinic acid (RA) and caffeic acid (CA) quantitatively. The separation system consisted of a C18 reversed-phase column, a gradient elution system of acetonitrile and 0.05 M sodium monohydrogen phosphate buffer, and a photodiode array detector. Detection wavelength was 330 nm. The flow rate was 1.0 mL/min. Retention time of RA and CA standards were about 30 and 9 minutes, respectively. Linear regression relationship was good (r＞0.99) between peak areas and concentrations in the range of 1 to 100 μg/mL. Detection limit of RA and CA were 0.54 and 0.12 μg/mL, and the limit of quantification were 1.80 and 0.40 μg/mL respectively. Recovery of both were greater than 91%. Ethanol(47.5% and 95%), 70 ℃ and 50 ℃ water were used to investigate the effect of solvents on the extraction of RA and CA from commercial herbal teas. Results indicated that RA content of Rosmarinus officinalis were 10.38±0.08, 7.77± 0.04, 3.21±0.05 and 2.01±0.00 mg/g extract in four solvents, respectively. However, the content of RA in Rosmarinus officinalis was the highest among those. It was found that there was the lowest RA content in Tilia sp. using 47.5% and 95% ethanol－ 0.43±0.01 and 0.32±0.00 mg/g extract, respectively. In the meantime, RA content of Lippia citriodora in 70 ℃ and 50 ℃ water were the lowest among those－0.13±0.00 and 0.07±0.00 mg/g extract, respectively. In addition to Mentha piperita in 70 ℃ and 50 ℃ water, RA content of others showed significant difference(p＜0.05) in different solvents of extraction. In a word, 47.5% ethanol was the best extraction solvent for RA. Cymbopogon sp. got the highest CA content using 47.5% ethanol extraction which was 1.88±0.01 mg/g extract. However, CA content of Salvia officinalis was the highest among those using 95% ethanol. Lippia citriodora showed the lowest CA content－1.04±0.00 mg/g extract in both 47.5% and 95% ethanol. While using 70 ℃ water as solvent, CA content of Rosmarinus officinalis was the highest－0.79±0.01 mg/g extract among those. In short, the results showed no significant difference among CA content in Tilia sp., Cymbopogon sp. and Centauea cyanus, and also between Centaurea cyanus and Mentha piperita. According to using 50 ℃ water as extraction solvent, CA content of Salvia officinalis was the highest－0.84±0.01 mg/g extract. And then results were stated that there were significant difference(p＜0.05) except for three groups－(Tilia sp. and Melissa officinalis), (Rosmarinus officinalis and Lippia citriodora), and (Matricaria chamomilla and Cymbopogon sp.). Between those groups were no significant difference in CA content. For CA extraction, 47.5% and 95% ethanol showed better results than solvent of water.

Keywords : herbal tea ; rosmarinic acid ; caffeic acid ; Heigh Performance Liquid Chromatography

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