Antioxidant, anti-semicarbazide-sensitive amine oxidase, and antihypertensive activities of geraniin isolated from Phyllanthus urinaria

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Abstract

The wrinkle-fruited leaf flower (Phyllanthus urinaria L.) (Euphorbiaceae) is widely used as a traditional folk medicine for inflammatory relief. Geraniin, the hydrolysable tannin, was purified by a series of chromatographic processes from the 70% aqueous acetone extracts of P. urinaria and identified by NMR [1H (500 MHz) and 13C NMR (126 MHz)] spectra and mass spectroscopy. The scavenging activities of geraniin against DPPH radicals (half-inhibition concentration, IC50, were 0.92 and 1.27 μM, respectively, for pH 4.5 and pH 7.9), hydroxyl radicals (IC50 was 0.11 μM by deoxyribose method and 1.44 μM by electron spin resonance method), and superoxide radicals (IC50 were 2.65 μM) were determined in comparison with positive controls. The inhibitory activities against xanthine oxidase (IC50 were 30.49 μM) were measured. Geraniin also showed dose-dependent inhibitory activities against semicarbazide-sensitive amine oxidase (SSAO, IC50 were 6.58 μM) and against angiotensin converting enzyme (ACE, IC50 were 13.22 μM). For kinetic property determinations, geraniin showed competitive inhibitions against SSAO (the apparent inhibition constant, Ki, was 0.70 μM) and mixed noncompetitive inhibitions against ACE. Spontaneously hypertensive rats (SHR, 10-week age) were orally administered to once (5 mg geraniin/kg SHR), and changes of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured over 24 h and compared with the positive control of captopril (2 mg/kg SHR). The geraniin showed antihypertensive activity in lowering SBP and DBP and showed a significant difference from the blank (distilled water) at 2, 4, 6, 8, and 24 h. Healthy food products could use geraniin for antioxidant protection and therapeutic effects in the future.