Anti-oxidative and Anti-tyrosinase Activities of Extracts of Purple Coneflower Seed

鄭文晏、顏裕鴻 ; 張耀南

E-mail: 9706733@mail.dyu.edu.tw

ABSTRACT

The three caffeic acid derivatives contents, anti-oxidative and anti-tyrosinase activities of extracts with 100% pure water (WEs), and 10%, 40%, 70% ethanol (0.1EtEs, 0.4EtEs, 0.7EtEs, respectively), and 10%, 40% and 70% glycerol (0.1GlEs, 0.4 GlEs, 0.7GlEs, respectively) of the powders (PCfSPs) of purple coneflower seeds produced in Taiwan were investigated in this study. The maximum caffeic acid derivatives contents (1.13% dried weight) was obtained from the freeze-dried 0.7EtEs of PCfSPs, while those (90.6？慊/mL 70% glycerol) was obtained from the 0.7GlEs of PCfSPs for glycerol extraction. Among the WEs and EtEs of PCfSPs, only the freeze-dried 0.7EtEs had the best DPPH-scavenging effect (IC50 activity: 97?慊 0.7EtEs/mL), while the 0.7GlEs had the strongest effect (IC50: 1.89% 0.7GlEs) for glycerol extraction. In general, the freeze-dried WEs and EtEs had better anti-tyrosinase activities than those of the hot-dried extracts. The anti-tyrosinase activities increased as increasing the extraction concentrations of ethanol. Among the WEs and EtEs of PCfSPs, only the freeze-dried 0.7EtEs had the best anti-tyrosinase activity (IC50: 625?慊 0.7EtEs/mL), while the 0.7GlEs had the strongest activity (IC50: 2.32% 0.7GlEs).

Keywords : purple coneflower seeds ; caffeic acid derivatives ; anti-oxidative activity ; anti-tyrosinase activity

Table of Contents

REFERENCES

1.邱建中、張隆仁、秦立德和勵鑫齋。2001。西方草藥---紫錐花(Echinacea)的栽培與利用。臺中區農業改良場研究彙報。73:43-54。 2.林資哲。2003。紫錐菊咖啡酸衍生物含量與抗氧化能力分析。國立中興大學農藝學系碩士論文。台中。台灣。 3.陳宜孜。2005。溫度與pH 對不同品種山藥抗氧化特性及其儲存性蛋白質dioscorin 安定性之影響。靜宜大學食品營養學系碩士論文。台中。台灣。 4.陳思廷。2001。強化免疫力的天然草藥—紫錐花萃取物 :北美銷售量第一的草藥。常春月刊。221 : 24-28。 5.陳勇智。2006。虎杖萃取液的抗氧化與抑制酪胺酸酵素之研究。大葉大學生物產業科技學系研究所碩士論文。彰化。台灣。 6.曾朝豐。2007。利用微生物發酵萃取紫錐菊有效藥理成分Cichoric acid 之研究。亞洲大學生物科技與生物資訊所碩士 論文。台中。台灣 7.趙春貴、張立傳、王暉和黃登宇。2005。肉桂酸及其衍生物抗氧化性研究。食品科學 26(1):218-222。 8.劉伯康、陳惠英、顏國欽。1991。數種傳統之食用植物甲醇萃取物抗氧化之研究。中國農業化學會誌。37: 105-116。 9.Ames, B. N. 1990. Endogeneousb DNA damage as related to cancer and aging. Mutat. Res. 214: 41-46. 10.Aruoma, O. I. 1994. Nutrition and health aspects free radicals and antioxidants. Food Chem. Toxic. 32(7): 671-683. 11.Awang, D. V. C. and D. G. Kindacl. 1991. Herbal medicine Echinacea. Can. Pharmaceutical J. 124: 512-515. 12.Bailly, F. and Cotelle, P. 2005. Anti-HIV activities of natural antioxidant caffeic acid derivatives toward an antiviral supplementation diet. Current Medicinal Chemistry 12(15):1811-1818. 13.Bauer, R. and Wanger, H. 1991. Ehinacea species as potential immunostimulatory drugs. H. Wanger and N. R. Farnsuorth(eds).Econ. Med. Plant Res. 5: 253-321. 14.Bauer, R., Hoheisel, O., Stuhltanth, I. and Wolt, H. 1999. Extracts of the Echinacea purpurea herb: an allopathic phytoimnunostimulant. Wiener Klinische Nochenschritt. 149: 185-189. 15.Chapman, D. S., and R. M. Auge. 1994. Physiological mechanisms of drought resistance in four native ornamental perennials. J. Amer. Soc. Hort. Sci. 119: 299-306. 16.Choi S. Y., Kim, S., Hwang, J. S., Lee, B. G., Kim, H. and Kim, S. Y. Benzylamide derivative compound attenuates the ultraviolet B-induced hyperpigmentation in the brownish guinish pig skin. Biochem Pharmacol 2004; 67:707-715. 17.Corrigan, F. M., Welsh, S. W., Skinner, E. R. and Horrobin, D. F. 1994. Brain lipid in aging and in Alzheimer ’ s Disease:a review. J. Nutr. Med. 4(3): 327-349. 18.Donald, B. P. 2000. Medicinal plants and phytomedicines linking plant

biochemistry and physiology to human health. Plant Physiol. 124: 217-244. 19.Espin, J. C., Wichers, H. J. 1999. Slow-binding inhibition of mushroom(Agaricus bisporus)tyrosinase isoforms by tropolone. J. Agr. Chem. 47: 2638-2644. 20.Ernest, V. C., Cecil, K., Heino, H., Hansruedi, G., Chie, S., Victoria, V., Vincent, J. H. J. and Thomas, P. D. 1999. Inhibitiors of mammalian melanocyte tyrosinase: in vitro comparisons of alkyl esters of gentisic acid with other putative inhibitors. Biochem Pharmacol. 57: 663-72. 21.Facino, R. M., M. Carin, G. Aldin., L. Saibene, P. Pietta, and P. Maurt. 1995. Echinacoside and caffeoyl conjugates protest collagen from free radical-induced degradation : a potential use of Echinacea extracts in the prevention of skin photodamage. Planta Med. 61: 510-514. 22.Fukumoto, L. R. and Mazza, G. 2000. Assessing antioxidant and prooxidant activities of phenolic compounds. J Agric Food Chem 48(8):3597-3604. 23.Gardner, P. T., White, T. A. C., McPhail, D. B., Duthei. 2000. The relative contributions of vitamin C, carotenoids and phenolics to the antioxidant potential of fruit juices. Food Chem 68(4):471-474. 24.Guyton, A. C. 1987. Human Physiology and Mechanisems of Disease. W. B. Saunders. London. 25.Halliwell, B., J.M.C. Gutteridge, C.E.Cross. 1992. Free radical, antioxidants and human disease:where are we now J. Lab. Clin. Med. 119(6): 598-602. 26.He, Y. J., Liu, B. H., Xiang, D. B., Qiao, Z. Y., Fu, T. and He, Y. H. 2006. Inhibitory effect of caffeic acid phenethyl ester on the growth of SW480 colorectal tumor cells involves β-catenin associated signaling pathway down-regulation. World Journal of Gastroenterology 12(31):4981-4985. 27.Hobbs, C. 1989.The Echinacea Handbook. Edetic Medical Orgen. Porthand OR. 28.Hudson, B. J. F. and Lewis, J. I. 1983. Polyhydroxy flavonoid antioxidants for edible oils. Structural criteria for activity. Food Chem 10(1)47-53. 29.Iozumi, K., Hoganson, G. E., Pemella, R., Everett, M. A. and Fuller, B. B. 1993. Role of tyrosinase as the determinant of pigmentation in cultured human melanocytes. J. Invest Dermatol. 100: 806-811. 30.Kawada, N., S. Seki, M. Inoue and T. Kuroki. 1998. Effect of antioxidants, Resveratrol, quercetin, and N-acetylcysteine, on the functions of cultured rat hepatic stellate cells and kupffer cells. Hepatol. 27: 1265-1274. 31.Kerem, Z., G. Regev-Shoshani, M. A. Flaishman and L. Sivan. 2003. Resveratrol and two monomethylated stilbenes from Israeli Rumex bucephalophorus and their antioxidant potential. J. Nat. Prod. 66: 1270-1272. 32.Keith, C. B. and Lawrence, M. 1994. Melanins: Hair dyes for the future. Cosm. Toil. 109: 59-64. 33.Kinsella, J., Frankel, E., German, B. and Kanner, J. :Possible mechanism for the protective role of antioxidants in wine and plant foods. Food Technol. 1993,47:85-89. 34.K. Maeda and M. Fukuda. 1991. In vitro effect of several whitening cosmetic components in human melanocytes. J. Soc. Cosmet. Chem. 42: 361-368. 35.Koner, A. and Pawelek, J. 1982. Mammalian tyrosinase catalases three reactions in the biosynthesis of melanin. Science. 217: 1163-5. 36.Letchamo, W., J. Livesey, T. J. Arnason, C. Bergeron, and V. S. Krutilina. 1999. Cichoric acid isobutylamide content in Echinacea purpurea as influenced by flower developmental stages. pp.494-498 . In: J. Janick(ed.), Perspectives on new crops and new uses. ASHS Press, Alexandria, VA. 37.Li, T. S. C. 1998. Echinacea : cultivation and medicinal value. HortTechnol. 8: 123-129. 38.Marieb, E. N. 1989. The Benjamin/Cummings Publishing Company. Human Anatomy and Physiology. California. 39.McCaleb, R. S., Leigh, E. and Morien, K. The encyclopedia of popular herbs. Prima Health USA 2002. 40.McGregor, R. L. 1968. The taxonomy of the genus Echinacea. Univ. Kansas Sci. Bul. 48: 113-142. 41.Milic, B. L., Djilas, S. M. and Canadanovic-Brunet, J. M. 1998. Antioxidative activity of phenolic compounds on the metal-ion breakdown od lipid peroxidation system. Food Chem 61(4):443-447. 42.Moure, A., J. M. Cruz, D. Franco, J. M. Dominguez, J. Sineior, H. Dominguez, M. J. Nunez, and J. C. Parajo. 2001. Natural antioxidants from residual sources. Food Chem. 72: 145-171. 43.Murray, M. T. 1995. The healing power of herb. Prima Health. USA. 44.Oliver, A., J. Price, T. S. C. Li, and A. Gunner. 1995. Echinacea : purple coneflower. B. C. Min. Agr. Fisheries Food Specialty Crops Infosheet. 45.Pawelek, J. M. After dopachrome. Pigment Cell Res 1991; 4:53-62. 46.Percival, S. S. 2000. Use of Echinacea in medicine. Biochem. Physiol. 60:155-158. 47.Perry, N. B., E. J. Burgess, and V. A. Glennie. 2001. Echinacea standardization : analytical methods for phenolic compounds and typical levels in medicinal species. J. Agric. Food Chem. 49: 1702-1706. 48.Pomerantz, S. H. 1963. Separation, purification and properties of two tyrosinases from hamster melanoma. J. Bio. Chem. 238: 2351-2357. 49.Pomponio, R., R. Gotti, M. Hudaib, and V. Cavrini. 2002. Analysis of phenolic acid by micellar electrokinetic chromatography : application to Echinacea purpurea plant extaracts. J. Chromatogra. 945: 239-247. 50.Ribinson, W. 1998. 1-Chicoric acid, an inhibitor of human immunodeficiency virus type 1(HIV-1)integrase, improves on the in vitro anti-HIV-1 effect of Zidovudine plus a protease inhibitor(AG1350). Antiviral Res. 39: 101-111. 51.Satoru, K., Kazuhiko, T., Norio, M. and Jinetsu, U. Antioxidative activity of apply skin or flesh extracts associated with fruit development on selected apply cultivars. Scientia Horticulturae. 2002; 96:177-185. 52.Singh, R. P. Chidambara-Murthy KN, Jayaprakasha GK. 2002. Study on the antioxidant activity of pomegranate peel and seed extracts using in vitro model. J Agric Food Chem 50(1)81-86. 53.Speroni, E., P. Govoni, S. Guizzardi, C. Renzulli, and M. C. Guerra. 2002. Anti-inflammatory and cicatrizing activity of Echinacea pallida Nutt. root extract. J. Ethnopharmacol. 79: 265-272. 54.Vinti, G., C. Chang, J. V. Slama, R. Barton, R. Bauer, R. Gahler and T. K. Basu. 2001. Echinacea stimulates macrophage function in the lung and spleen of normal rats. Journal of Nutrirional Biochemistry 13:487-492. 55.Vinti, G., C. Chang, J. V. Slama, R. Barton, R. Bauer, R. Gahler and T. K. Basu. 2002. Alkylamides of Echinacea purpurea stimulate alveolar macrophage function in normal rats. International Immunopharmacology 2:381-387