Bioassay-guided purification and identification of antioxidant compounds in *Scorzonera papposa* extracts

A. Braca[1]. A. Bader[2], L. Milella[3], G. Imbrenda[3], G. Autore[4], N. de Tommasi[4]

[1]Dept. of Pharmacy, University of Pisa, Pisa – Italy
[2]Dept. of Pharmacognosy, Umm Al-Qura University, Makkah - Saudi Arabia
[3]Dept. of Science, University of Basilicata, Potenza - Italy
[4]Dept. of Pharmaceutical Science, University of Salerno, Fisciano - Italy

Abstract

Wild edible plants have attracted the attention of mankind since remote antiquity. They represent an important source of food, beverages and natural remedies for several ailments. In the Middle East a narrow number of Bedouins live in the desert depending mainly on the pasture of goats and camels, they have a good knowledge about edible (Dal Piaz et al. 2009, Malafronte et al. 2012) medicinal and aromatic plants (Bader et al. 2003). *Scorzonera papposa* DC. Asteraceae grows extensively in desertic, semi-desertic and mountain environments of Jordan specially after raining season; all parts of this plant are considered edible and they are eaten raw or cooked (Tukan et al. 1998). This study aims to investigate the antioxidant activity of *Scorzonera papposa* aerial part and root extracts. Then, following a bioassay-guided purification protocol we have isolated and identified the secondary metabolites mainly responsible of *Scorzonera papposa* antioxidant activity. The tuberous roots and the aerial parts of *S.papposa* were collected during the flowering stage in the Dab'a desert reserve, dried and extracted with *n*-exane, $CHCl_3$, $CHCl_3$-MeOH 9:1, and MeOH to measure their antioxidant activity. No single assay can determine the antioxidant activity, different approaches are needed. For this reason extract antioxidant activity was measured by 3 different methods: 2,2- diphenyl-1-picrylhydrazyl (DPPH), ferric reducing antioxidant power (FRAP) and β-carotene bleaching assays (BCB). Total phenolic content using Folin-ciocalteu method was also measured (Russo et al., 2012; Padula et al., 2012). Results were compared with a new model system called Relative Antioxidant Capacity Index (RACI) (Russo et al., 2012). The MeOH extracts of both aerial parts and roots showed the highest RACI. MeOH extracts were then fractionated by Sephadex LH 20 and obtained fractions RACI was also measured. Semi-quantitative HPLC was performed on the most active fractions and NMR analysis to elucidate the secondary metabolite structures. Flavone *C*-glycosides (orientin, isoorientin, swertiajaponin, isovitexin, isoschaftoside), C_6-C_3 derivatives (syringin), dihydroisocoumarin (thunberginol G), coumarins (cichorin), and quinic acid derivatives (5- and 3-caffeoylquinic acids) were isolated and found to be the major responsible of the antioxidant activity of the extract. Two new 2-deoxy-d-ribono-g-lactone derivatives were also isolated.

Dal Piaz, et al., *J. Med. Chem*. 2009, 52, 3814–3828.
Malafronte et al. *Phytochem. Lett*. 2012, 6, 621-625.
Bader, el al. *Phytochemistry* 2003, 62, 1277–1281.
Tukan el al. *Int. J. Food Sci. Nut*. 1998, 49, 225-235.
Padula et al 2012 *Food Chemistry* DOI: 10.1016/j.foodchem.2012.11.025. Russo et al. (2012) *Pharmacologyonline* 1 (SPL. 1) , pp. 84-93