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Antioxidative Effects of the Extracts from Korean Wild Plants

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ABSTRACT

The antioxidative effects of the extracts from *Salicornia herbacea* and *Ixeris dentata* were analyzed with 2,2-diphenyl-1-picrylhydrazyl (DPPH). The RC_{80} of the ethanol-extract from *I. dentata* was 32.26㎍/㎖, while the RC_{80} of ascorbic acid and glutathione, well-known antioxidants were 14.16 and 64.69㎍/㎖, respectively. However, in the case of the ethanol-extract from *S. herbacea* it was 108.29㎍/㎖. The cell viability in the group treated with the extracts from *I. dentata* leaves increased by 174% compared with the control 24 hr after irradiation. On the whole, the ethanol extracts resulted in a higher scavenging activity than the water extracts. Especially, the ethanol-extract from *I. dentata* leaves had the highest activity among all the extracts studied. It is suggested that *S. herbacea* and *I. dentata* are useful source materials for nutraceutical and pharmaceutical applications.

I. INTRODUCTION

Salicornia herbacea is a halophyte inhabited the tidal silts in the west- and south-coastal area of the South Korea. It belongs to the Chenopodiaceae family, accumulates a great amount of salt, Mg, Ca, Fe, and K and thus contains high levels of minerals in its body (Choo and Song, 2000). The plant has long been a functional food or medicinal plant in many countries. According to the recent research, *S. herbacea* proved an

effective diet and an antioxidant as well (Jo *et al.*, 2002). However, the biological and dietary potentials of *S. herbacea* are not fully understood. *Ixeris dentata* is a typical oriental herb. The plant has been used for treatment of pneumonia, contusion, tumer and hepatitis. It also has been used for treatment of allergic diseases as a folk therapy in Korea. According to the recent research, *I. dentata* proved a hypocholesterolaemic effect and an antioxidant as well. *I. dentata* is known to have aliphatics, triterpenoids and sesquiterpene glycosides in its composition (Arai *et al.*, 1963). Antioxidant defenses normally protect against such oxidative damages. Some naturally occurring antioxidants including α-tocopherol, ascobic acid and carotenoids have been used in food industry and preventive medicine. However, even though α-tocopherol and other naturally occurring antioxidants are considered to be active in eliminating the reactive oxygens and controlling the toxic effects, they have been limited of their usage as antioxidants because of low effectiveness(Fang *et al.*, 1993). Therefore, we assessed the antioxidant activity of korean wild plants, *S. herbacea* and *I. dentata* to develop a new safer type of antioxidant.

II. MATERIALS AND METHODS

Preparation of water- and ethanol-extracts of the Plants ; *S. herbacea* were collected in the west-coast of South Korea in June. Its identity was authenticated by a plant taxonomist. The dried wholebody of *S. herbacea* was roughly grounded and extracted with water or ethanol. The powder of *I. dentata* leaf was kindly provided by ChunGil Biotec Co. The powder of *I. dentata* leaf was extracted with water or ethanol, too. The extracts were filtered and lyophilized to obtain the powder *S. herbacea* and *I. dentata.*

DPPH assay ; The DPPH (0.01 mM) in methanol was mixed well with the diluted extracts solution in DMSO and kept in dark for 30 min.

The absorbance at 517 nm was monitored in presence of different concentrations of extracts. Blank experiment is also carried out to determine the absorbance of DPPH before interacting with the extracts.

MTT cell viability assay ; Cells were cultured in Dulbecco's Modified Eagle's Medium (DMEM) supplemented with 10% heat-inactivated fetal bovine serum (Gibco) at 37℃ in 5% CO_2, 95% O_2 in a humidified cell incubator. B16 melanoma cells were inoculated 6 well plates by 2×10^4 cells/㎖ concentration. They were cultured in DMEM medium for 24 h prior to the addition of test compounds. The cell viability was assayed by MTT assay at 0h and 24h after irradiation6). The absorbance was measured with a spectrophotometer at a test wavelength of 580 nm with a reference wavelength of 690 nm.

Irradiation ; The irradiated groups were exposed to γ-radiation from a ^{60}Co source with a total dose of 6.5 Gy, and a dose rate of 12.8 Gy/hr.

III. RESULTS AND DISCUSSION

The antioxidative effects of water- and ethanol-extracts from *S. herbacea* and *I. dentata* were analyzed with 2,2-diphenyl-1- picrylhydrazyl (DPPH) and comparisons were made on the basis of RC_{80} value which indicated the amount required for 80% reduction of DPPH. The results of DPPH free radical scavenging assay were that RC_{80} of ascorbic acid, glutathione, water- and ethanol-extracts of *S. herbacea* and *I. dentata* were 14.16, 64.69, 179.77, 108.29, 75.90, and 32.26㎍/㎖, respectively (Fig. 1).

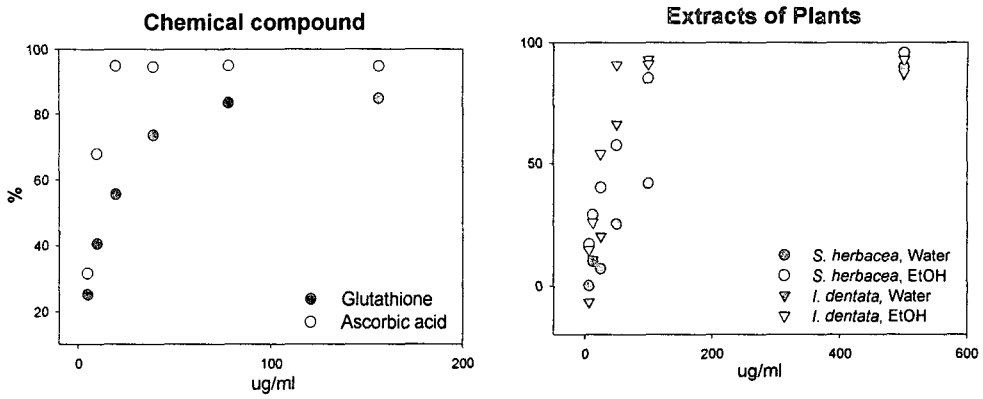

Fig. 1. Effect of the concentration of test materials on percentage decrease in DPPH absorption at 517nm.

The viability assay was done on the cells treated with the water-extracts from *S. herbacea* and *I. dentata* leaves. The cell viability in the group treated with the extracts from *I. dentata* leaves increased by 174% compared with the control 24 hr after irradiation. However, in the group treated the water-extracts from *S. herbacea,* the cell viability decreased by 12% in comparison with that of the control (Table 1).

Table 1. Effects of the plant extracts and chemical compounds on B16 melanoma cells cultured for 24 hours *in vitro*.

Group	Hours		Cell viability(%)
	0 hr.	24 hr.	
Con.(saline)	1.98	3.42	100
Con.-Rad.	1.72	1.27	43
Ascorbic acid	1.21	2.13	102
Ascorbic acid-Rad.	1.71	2.14	72
S. herbacea	1.72	2.20	74
S. herbacea-Rad.	0.73	0.48	38
I. dentata	1.78	2.82	92
I. dentata-Rad.	1.50	3.06	118

On the whole, the ethanol extracts resulted in a higher scavenging activity than the water extracts. Especially, the ethanol-extract from *I. dentata* leaves had the highest activity among all the extracts in this study. However, the others can be still regarded as useful antioxidants since they also showed a moderate radioprotective activity in B16 cells. It is suggested that *S. herbacea* and *I. dentata* are useful source materials for nutraceutical and pharmaceutical applications.

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