P.56 Antioxidant Activity and Total Phenol Compounds in Korean Cereal Grain extracts

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Objective

The objective of this study was to determine total antioxidant capacity of 80% ethanolic extracts of cereal grains by testing the ability of these extracts to inhibit UV-induced lipid peroxidation in vitro using linoleic acid in comparison to well-known antioxidant such as ascorbic acid and tannic acid. Relationship between phenol compounds content in ethanolic extracts of cereal grains and total antioxidant capacity of investigated extracts.

Materials and methods

Cereal Samples

Seed stocks of wheat, barely, oat grain samples were obtained by plants grown 2000-2001 in the research farm at Korea university.

Extracts Preparation and Antioxidants Determination

To prepare 80% ethanolic extracts of cereals, ground, dried samples were extracted with 80% aqueous methanol (150 mL) by agitating (150rpm) for 24h at 20 ° C. Extracts were filterscreened and ethanol soluble extractant was evaporated under vacuum. The residues were refrigerated and freeze-dried. The lyophilizate was dissolved in methanol for measuring the electron donating ability, the inhibition of UV-induced lipid peroxidation in linoleic acid, and for the determination of total phenol compounds.

Results and discussion

The total phenolic content of the cereal grain (80% ethanolic extracts) investigated in this study varied from 2.1 (wheat cv. Olgeurumil) to 10.4 (barely cv. Seodunchalbori). The relationship between total phenol compounds and antioxidant activity of all 80% ethanolic extracts is given by the equation $y = 138.75x - 2.17$, with $R^2 = 0.82$. This result indicated that there was a highly positive relationship between total phenol compounds and antioxidant activity. When the antioxidant activities of all investigated extracts were measured with application of same quantity of phenol compounds, oat grain extracts exhibited similar antioxidant activity of barely cultivars. However barely extract appeared as the most potent antioxidant activity using UV-induced lipid. This indicated that factors such as phenol compound composition, their individual antioxidant activity, and solubility together with other water and lipid-soluble antioxidant could play a crucial role in the total antioxidant activity of cereal grains.

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Table1. Total phenol contents and antioxidant activity of cereal grain extracts

Cereal grain	Total phenol contents (mg/g seed)†	Electron donating ability(%)‡	TBARS (Inhibition %)∫
Oat (whole meal)	2.69	27.34 ± 3.13∬	26.74 ± 20.62*
Wheat (Urimil)	2.84	14.43 ± 4.31*	-11.26 ± 26.55
Wheat (Tapdongmil)	2.89	20.63 ± 10.55*	-38.47 ± 11.66
Wheat (Alchanmil)	3.08	16.82 ± 2.26*	-2.59 ± 10.27
Wheat (Olgeurumil)	2.48	22.75 ± 15.95*	-7.92 ± 6.16
Barely (Namhyangbori)	5.25	76.45 ± 10.39*	6.93 ± 8.71*
Barely (Jinyangbori)	6.24	76.79 ± 0.48*	16.40 ± 9.58*
Barely (Doosan #8)	4.27	69.72 ± 0.19*	16.86 ± 8.56*
Barely (Doosan #29)	6.89	80.04 ± 2.74*	45.58 ± 22.23*
Barely (Saeolbori)	7.11	78.93 ± 0.53*	16.40 ± 13.14*
Barely (Saessalbori)	4.57	77.21 ± 1.07*	9.86 ± 3.45*
Barely (Saegangbori)	6.42	75.82 ± 0.95*	23.16 ± 16.02*
Barely (Olbori)	8.73	78.69 ± 0.79*	34.48 ± 16.02*
Barely (Seodunchal)	10.16	80.67 ± 2.15*	22.18 ± 1.15*
Barely (Chalbori)	6.65	81.38 ± 1.67*	33.88 ± 15.24*
Tannic acid	-	91.24 ± 0.19*	82.22 ± 1.99*
Ascorbic acid	-	92.77 ± 0.27*	74.01 ± 0.46*

† Total phenol contents by Folin-Ciocalteus Methods performed duplicate ‡ EDA (%)= (1-sample Abs./ control Abs.) x 100

∫ Inhibition (%) = (1-sample Abs./ control Abs.) x 100 ∬ Data are means±SD

* Means are significantly different from control at $p<0.05$ as determined by Fisher's least significantly different test

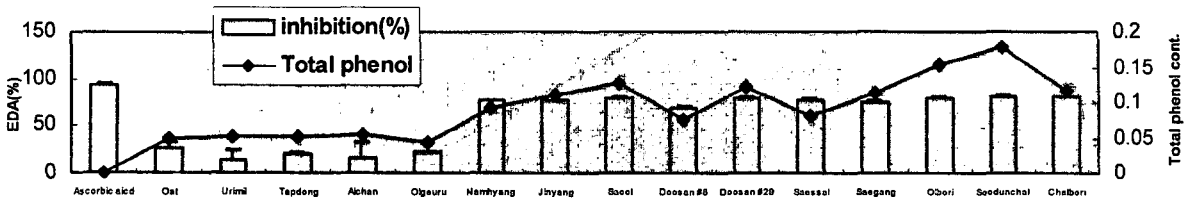

Figure 1. Total phenol compounds and electron donating abilities (EDA) of cereal grain extracts to 1-diphenyl-2-picrylhydrazyl (DPPH) radicals

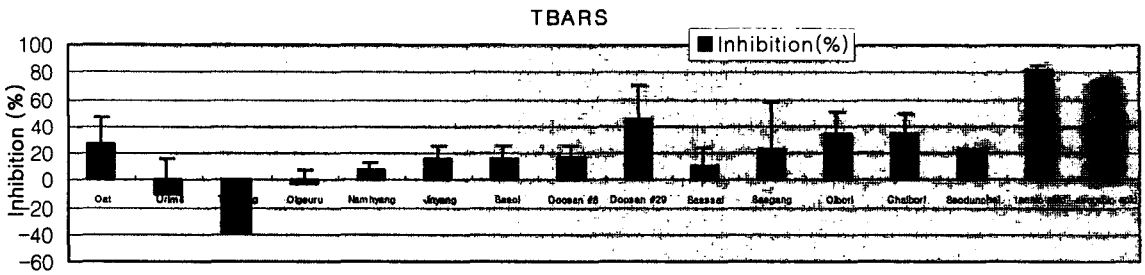

Figure 2. Inhibitory effect of lipid peroxidation induced by U.V. radiation by cereal grain extracts and major antioxidants