P03-037

Antioxidant activity of curcuma (*Curcuma longa L.*) extracts with various extraction conditions

Si Hyun Kim[1], Eun Byeol Lee[1], Ji Hye Choi[1], Ji Su Kim[1], Un Yul Jeong[1], Ju-Hui Kim[1], Sung Hyen Lee[1*]

[1]National Institute of Agricultural Sciences, Rural Devleopment Administration, Nongsaengmyeong-ro, Iseo-myeon, Wanju_Gun, Jeollabuk-do 55365, Korea

ABSTRACT

This study investigated the antioxidant activity and cytotoxicity of curcuma (*Curcuma longa L.*) by condition (color, temperature, soil, solvent multiple and ethanol). Antioxidant activity of the curcuma extract was measured by 2,2'-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acd) (ABTS) and polyphenol content. MTS and LPS-triggered nitric oxide (NO) release were measured in Raw 264.7cells. Superoxide dismutase activity in the cell's supernatant was measured according to the method of Colorimetric Activity Kit. Catalase-like activity was measured according to the method of Catalase Colorimetric Activity Kit. In DPPH and ABTS, dark color of curcuma showed the highest antioxidant activity. In DPPH, ABTS and total polyphenol assay, ethanol extracts had a higher antioxidant effect than hot water extracts. Cytotoxicity was evaluated by MTS. Then, SOD (superoxide disumutase) and CAT (catalase) of the ethanol extracts were evaluated at a concentration without cytotoxicity. As a result of evaluating the cell viability of the ethanol extract in RAW 264.7 cells, curcuma did not exhibit cytotoxicity. After evaluating cytotoxicity, SOD assay and CAT effects were evaluated with the ethanol extract. Ethanol extract significantly increased SOD and CAT antioxidant activity according to curcuma dose. Overall, cytotoxicity and antioxidant activity effects according to the various of curcuma suggested that it may be of great help in future research on curcuma as functional materials.

MATERIAL AND METHOD

✓ *Curcuma longa L.*

- *Curcuma Longa L.* is a type of herb belonging to the ginger family and is widely cultivated in southern and southwest tropical Asia.
- *Curcuma Longa L.* is known to have arthritis, anti-inflammatory, and anti-cancer effects.

✓ Samples according to various extraction conditions

- Temperature (50℃, 60℃, 70℃, 80℃)
- Soil (Clay, Masato)
- Color (Random, Light, Medium, Dark)
- Solvent multiple (10 times, 30 times)
- Ethanol(30%, 50%)

✓ Method

- MTS, NO
  - Raw 264.7cell, 1×10^5cell/well, LPS 2μg/ml
- DPPH, ABTS, Total polyphenol
  - Concentration: 1000, 500, 250, 125, 62.5, 31.13μg/ml
- SOD, CAT
  - Raw 264.7cell, 1×10^5cell/well, cell's supernatant,
  - SOD(Colorimetric activity kit)
  - CAT(Catalase colorimetric activity kit)

RESULT

Table 1. DPPH, ABTS radical scavenging activity of curcuma extracts with various extraction conditions and the content of total phenolic compounds

	Condition	DPPH radical scavenging IC50 (μg/mL)	ABTS radical scavenging IC50 (μg/mL)	Total polyphenol (μg GAE[1])/g)
Temperature	50℃	779.8	264.4	1997 ± 64.9[a 2)]
	60℃	1562	258	1702 ± 34.0[b]
	70℃	445.3	259.3	1756 ± 27.8[b]
	80℃	332.2	245.6	1963 ± 23.2[a]
Soil	Clay	1039	215.3	2161 ± 3.3[b]
	Masato	866.5	236.1	1764 ± 14.3[e]
Color	Random	2402	233.2	1861 ± 3.7[d]
	Light	3785	260.3	1371 ± 26.4[f]
	Medium	1157	188.1	2004 ± 5.9[c]
	Dark	283.1	143.5	2815 ± 13.8[a]
Solvent multiple	10 times	987.6	156	1735 ± 70.3[d]
	30 times	588.9	112.4	2298 ± 7.1[c]
Ethanol	30%	448.1	101.5	2784 ± 61.0[b]
	50%	197.2	83.01	3598 ± 81.4[a]

[1)]GAE, equivalent to gallic acid.
[2)]Mean±SE (n=3) within each column followed by different letters are significantly different (p<0.05) among groups by Duncan's multiple rage test. Group: temperature, soil-color, solvent multiple-ethanol.

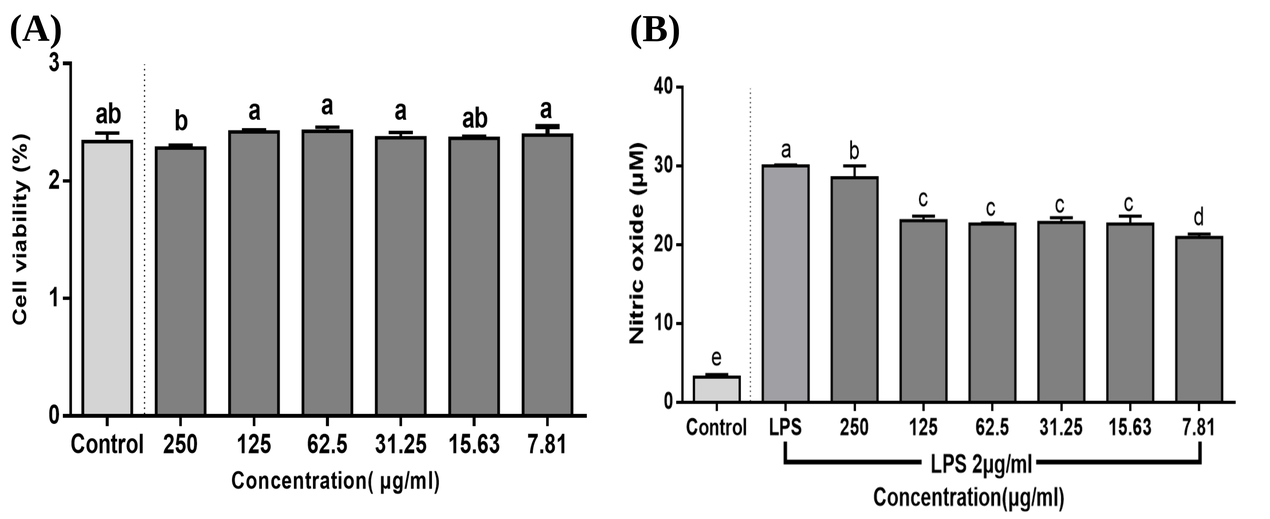

Fig. 1. Cytotoxic activity of ethanol extract from *curcuma longa L.* on Raw 264.7 cells treated with *curcuma longa L.* ethanol extract for 24 hour and analyzed for MTS(A) and NO(B) The data was analyzed by one-way ANOVA using SPSS software and each bar presents the mean±S.E. (n=3). [a-e] Mean values with different letters are significantly different (p<0.05) among groups by Duncan's multiple rage test.

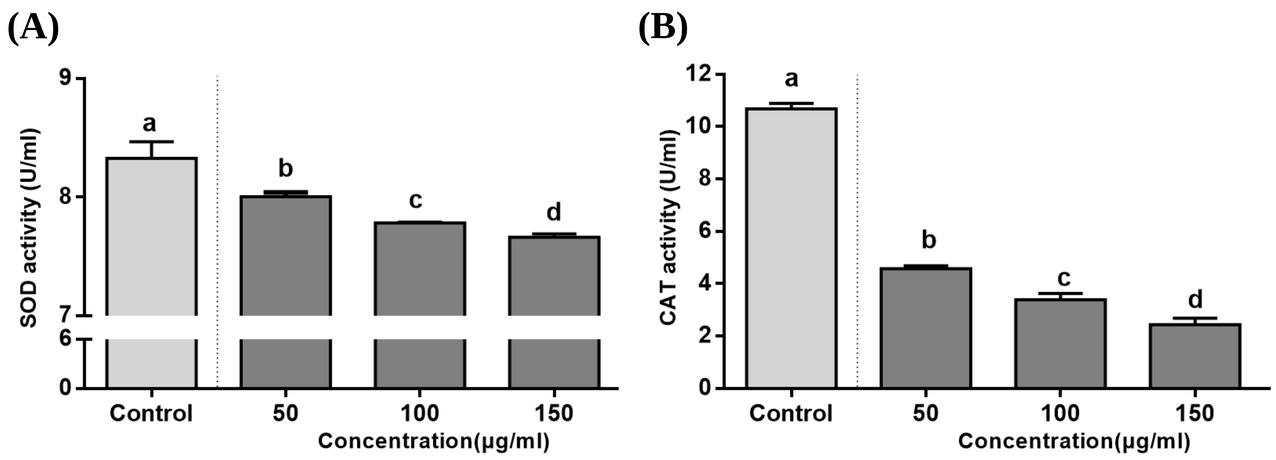

Fig. 2. Effect of *curcuma longa L.* ethanol extract on SOD(A) and CAT(B) activity The data was analyzed by one-way ANOVA using SPSS software and each bar presents the mean±S.E. (n=3). [a-d] Mean values with different letters are significantly different (p<0.05) among groups by Duncan's multiple rage test.

CONCLUSION

Collectively, a comparison of curcuma under various conditions will be helpful in future studies, these results suggest that the ethanol extract of curcuma (*Curcuma longa L.*) has potential antioxidant effects. It will also be of great help in future research on curcuma longa L. as functional substances.

* This study was supported by grant (PJ01583902) from Rural Development Administration, Republic of Korea.

REFERENCE

Mahsa Sobhani, Mohammad Hosein Farzaei, Sarah Kiani, Reza Khodarahmi. (2021) Immunomodulatory; Anti-inflammatory/antioxidant Effects of Polyphenols: A Comparative Review on the Parental Compounds and Their Metabolites. Food Reviews International 37:8, pages 759-811.