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Quantification of quercetin production and alteration of total polyphenol, flavonoid and antioxidant activity due to heating effect in *Allium cepa* L bulb

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실험목적 (Objectives)

The objective was to find the optimum temperature for maximum polyphenol and flavonoid content, antioxidant activity and quercetin (aglycone) production using the far infrared drying (FIRD) and oven drying (OD) methods in a comparative way. To determine, if heat has a toxic effect on onions, cytotoxic activity was also evaluated in macrophage cells.

재료 및 방법 (Materials and Methods)

1. Estimation of total polyphenol and total flavonoid content.
2. Antioxidant assay
a. DPPH free radical scavenging activity,
b. Reducing power assay,
3. Cell line and cell culture
d. Nitric oxide scavenging activity,
4. Cytotoxicity evaluation. 5. HPLC quantification of quercetin (aglycone)

실험결과 (Results)

The onion exposed at 80℃ in FIRD between 5 to 25 min caused approximately 6 and 5 fold increases in polyphenol and flavonoid respectively. Similarly, the highest polyphenol (15.143±2.14 mg/g) and flavonoid (4.198±1.04 mg/g) content were identified at 170℃ in the OD exposed samples. The HPLC analysis revealed that the quercetin production was increased approximately 5 fold in between 20-30 min at 80℃ in FIRD and 4 fold at 210-230℃ in OD compare to that of control. The antioxidant (free radical scavenging and reducing power) property was also increased with increase in temperature and exposure time. In addition, treated onion extracts scavenged NO production in a dose-dependent manner compared to the control without cytotoxic effects.

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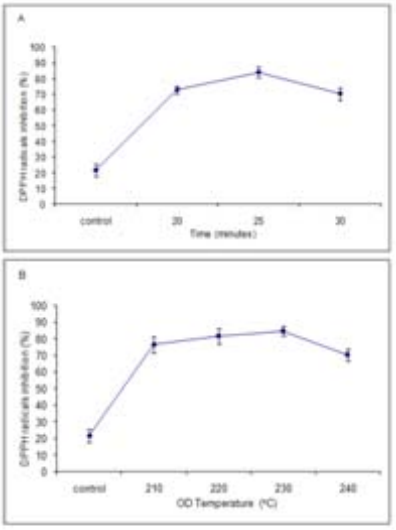

Fig.1.DPPH free radical scavenging activity (A) FIR (B) OD

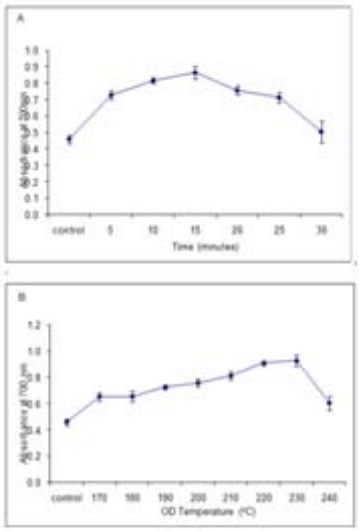

Fig 2. Reducing power (A) FIR (B) OD

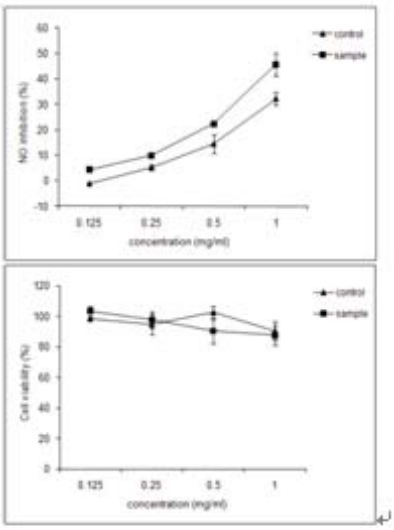

Fig 3.(A) NO scavenging activity, (B) cytotoxicity (MTT) assay.

Fig 1(A)

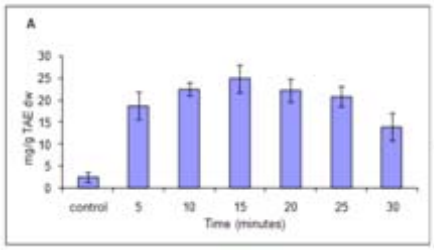

Fig 1(B)

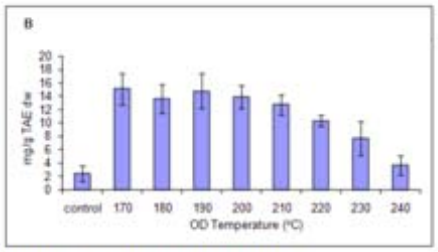

Fig 4. (A) Total flavonoid Content in (A) FIR and (B) OD.

Sample	Quercetin content mg/g dw
Control (untreated)	0.205±0.041^{b}
FIRD (80°C) 20min	0.775±0.067^{c}
FIRD (80°C) 25min	1.020±0.036^{a}
FIRD (80°C) 30min	0.830±0.059^{cd}
OD 210°C	0.858±0.052^{d}
OD 220°C	0.872±0.038^{d}
OD 230°C	0.891±0.042^{d}
OD 240°C	0.108±0.023^{a}

All value is expressed as the mean ± SD (n = 3)

Table 1. HPLC quantification of Quercetin in mg/g dw