

Quantitative determination of active ingredient content and evaluation of anti-neuroinflammatory effect of “Baek Chul” distributed in Korea

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Abstract

Background: “Baek Chul” is a perennial belonging to the Compositae family, and mainly distributed in Korea, Japan, and Manchuria. In Korea, the dried rhizomes of *Atractylodes japonica* (*A. japonica*) and *A. macrocephala* are used for food and medicine. These plants contains various ingredients including the essential oil atractylon, atractylonolide I, atractylonolide II, and atractylonolide III. In this study, we tried to analyze the content of active ingredients, and evaluate the anti-neuroinflammatory acitivity using the ethanolic extracts of *A. japonica* and *A. macrocephala* (AEs) distributed in Korea.

Methods and Results: The dried rhizomes of *A. japonica* and *A. macrocephala* were extracted twice with 50% fermented ethanol. The quantitative analysis showed that the content of the atractylenolide I, II, and III. For evaluating of the anti-neuroinflammatory effect of the AEs, BV2 microglial cells were pre-treated with or without the various concentrations for 3 h and then stimulated with LPS (1 µg/mL) for 24 h. The nitrite concentration which is the indication of nitric oxide (NO) production was measured by the Griess reaction. Pre-treatment with AEs significantly inhibited the production of NO induced by LPS in BV2 cells.

Conclusion: This study successfully analyzes and compares the contents of three atractylenolides contained in ethanol extracts of *A. japonica* and *A. macrocephala* distributed in Korea. In addition, this investigation shows that these extracts have anti-neuroinflammatory activity by inhibiting the production of NO in LPS-induced BV2 microglial cells.

Keywords: *Atractylodes japonica*, *Atractylodes macrocephala*, essential oil, atractylenolides, anti-neuroinflammation

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Results

Figure 1. HPLC chromatograms of 50% ethanolic extracts of *A. japonica* and *A. macrocephala* distributed in Korea, and mixed standards.

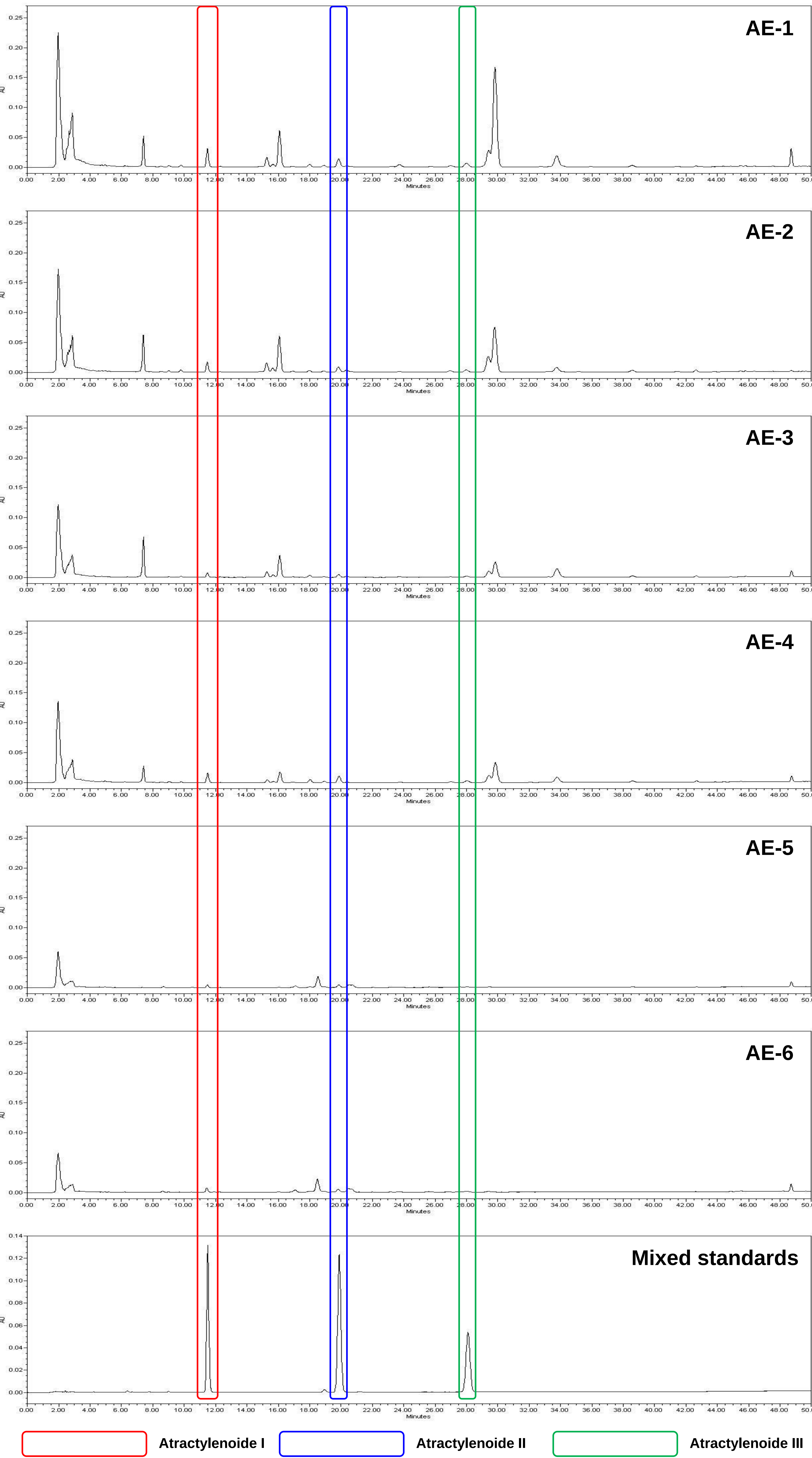


Table 1. Contents of atractylenolides of 50% ethanolic extracts of *A. japonica* and *A. macrocephala* distributed in Korea.

236 nm						
N = 3						
Sample	Atractilenolide I (mg/ml)	RSD* (%)	Atractilenolide II (mg/ml)	RSD* (%)	Atractilenolide III (mg/ml)	RSD* (%)
AE-1	2.251 ± 0.023	1.800	1.054 ± 0.010	1.592	1.199 ± 0.018	2.531
AE-2	1.187 ± 0.010	1.491	0.628 ± 0.022	6.132	0.672 ± 0.007	1.901
AE-3	0.510 ± 0.002	0.514	0.309 ± 0.002	1.382	0.374 ± 0.005	2.187
AE-4	1.156 ± 0.008	1.166	0.824 ± 0.008	1.711	0.552 ± 0.009	2.830
AE-5	0.317 ± 0.001	0.615	0.297 ± 0.004	2.398	0.141 ± 0.002	2.619
AE-6	0.492 ± 0.004	1.250	0.342 ± 0.002	1.261	0.222 ± 0.005	4.058

Values are the mean ± SEM.
RSD* : Relative standard deviation.

Table 2. Parameters of the calibration curve for method validation.

236 nm				
Compounds	Retention time (min)	Calibration equation ^a	Correlation coefficient (r ²)	Concentration range (ng/ml)
Atractilenolide I	11.499	y=13277.434x + 4716.452	0.998	0.195 ~ 100
Atractilenolide II	19.886	y=18118.334x + 7143.398	0.998	0.391 ~ 100
Atractilenolide III	28.095	y= 9766.777x + 3736.730	0.998	0.781 ~ 100

^ay: peak area, x: concentration of standards (mg/ml).

Figure 2. The cytotoxicity effect of AEs in BV2 microglial cells.

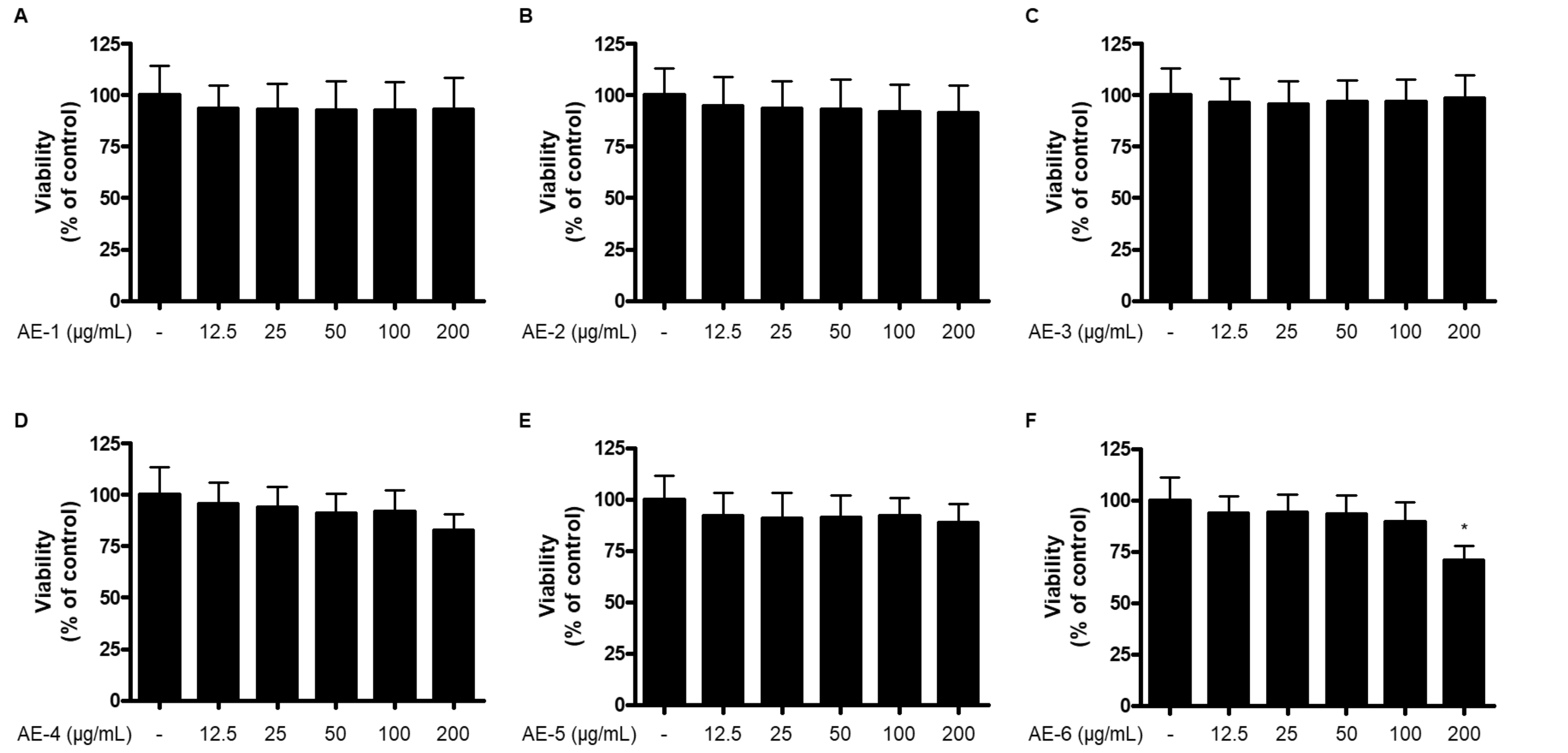


Figure 3. The effects of AEs on the production of NO in LPS-induced BV2 microglial cells.

