P03-036

Comparative analysis of bioactive compounds between *Artemisia capillaris* Thunb and *Artemisia iwayomogi* Kitamura

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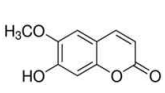
Hongcheon Institute Medicinal Herb

Introduction

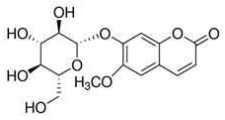
Artemisia, belonging to the daisy family *Asteraceae*, include the various species like mugwort, wormwood and sagebrush. After COVID-19 pademic, some pharmaceutical botanists suggests any bioactive compound present in *Artemisia* genus might play a role part in the significant activity against SARS coronavirus and could be popularized as a therapeutic agent for the reason of cheap and easily available. Among the most used *Artemisia* genera in Korea, we noted that two *Artemisia* genera, *Artemisia capillaris* Thunb(ACT) *and Artemisia iwayomogi* Kitamura(AIK), were being used interchangeably. In this study, we revealed the different ingredients between ACT and AIK.

Marker Compounds



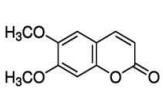
Scopoletin

- Molecular Formula: $C_{10}H_8O_4$
- Molecular Weight: 192.16



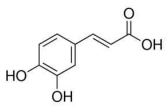
Scopolin

- Molecular Formula: $C_{16}H_{18}O_9$
- Molecular Weight: 354.31



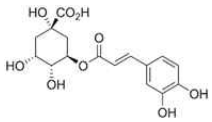
Scoparone

- Molecular Formula: $C_{11}H_{10}O_4$
- Molecular Weight: 206.19



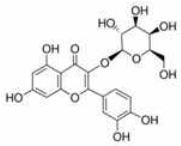
Caffeic acid

- Molecular Formula: $C_9H_8O_4$
- Molecular Weight: 180.16



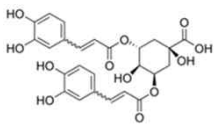
Chlorogenic acid

- Molecular Formula: $C_{16}H_{18}O_9$
- Molecular Weight: 354.31



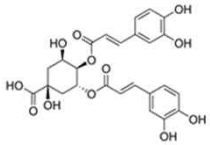
Hyperoside

- Molecular Formula: $C_{21}H_{20}O_{12}$
- Molecular Weight: 464.38



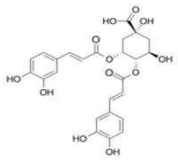
Isochlorogenic acid A

- Molecular Formula: $C_{25}H_{24}O_{12}$
- Molecular Weight: 516.45



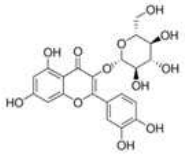
Isochlorogenic acid B

- Molecular Formula: $C_{25}H_{24}O_{12}$
- Molecular Weight: 516.45



Isochlorogenic acid C

- Molecular Formula: $C_{25}H_{24}O_{12}$
- Molecular Weight: 516.45



Isoquercitrin

- Molecular Formula: $C_{21}H_{20}O_{12}$
- Molecular Weight: 464.38

Materials and methods

Figure 1. Materials (A: *Artemisia capillaris* Thunb, B: *Artemisia iwayomogi* Kitamura)

HPLC Conditions

Instrument	Shimadzu HPLC-UV
Column	Cosmosil C18 (4.6mm x 250mm, 5um)
Column Temp	35℃
Wavelength	330nm
Mobile phase	(A) 0.1% FA* in DW** (B) 0.1% FA in AcN***
Flow	1 mL/min
Injection volume	10 μL

*formic acid **distiled water ***acetonitrile

Gradient profile

Time (min)	Solvent A (%)	Solvent B (%)
0	90	10
30	80	20
50	80	20
51	60	40
55	60	40
56	90	10
70	90	10

Shimadzu, HPLC Systems.

- Extraction of ACT and AIK

➔ 5g of Powdered ACT(AIK) + Solvent 100 mL → Reflux extraction → Filter(filter paper)

➔ Using the Simultaneously Analysis Method(SAM) developed by our research team, total 10 candidate bioactive compounds-scopoletin, scopolin, scoparone, caffeic acid, chlorogenic acid, hyperoside, isoquercitrin, isochlorogenic acid B, isochlorogenic acid A, isochlorogenic acid c-have been analyzed from ACT and AIK under 100% ethanol and distilled water extractions.

Results

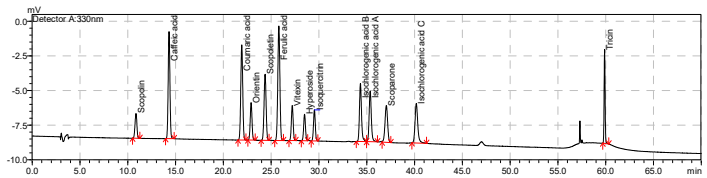


Figure 2. HPLC chromatograms of marker compounds. total 10 candidate bioactive compounds-Scopoletin, Scopolin, Scoparone, Caffeic acid, Chlorogenic acid, Hyperoside, Isoquercitrin, isochlorogenic acid B, Isochlorogenic acid A, Isochlorogenic acid C.

Table 1. The regression data, marker compounds 1 - 10 analyzed by UPLC

Compound	Concentration	Regression equation	R^2
Scoparone	0.20-200.00	y = 31157x - 4804.1	0.9998
Scopolin	0.09-2.84	y = 17610x - 163.72	1
Chlorogenic acid	6.51-208.25	y = 31502x + 46050	0.9999
Caffeic acid	1.78-113.71	y = 55007x + 13861	0.9999
Scopoletin	0.51-32.82	y = 34564x + 2695.1	0.9999
Hyperoside	0.35-88.51	y = 18006x + 2106.5	0.9999
Isoquercitrin	1.68-53.71	y = 17666x + 157.07	1
Isochlorogenic acid B	4.07-130.20	y = 33401x - 1400.9	1
Isochlorogenic acid A	6.04-193.20	y = 43565x - 58998	0.9995
Isochlorogenic acid C	4.29-137.20	y = 31415x - 14721	1

Figure 3. HPLC chromatograms of *Artemisia capillaris* Thunb extracts.

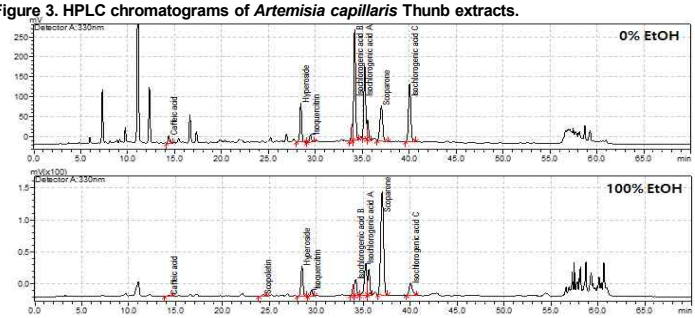


Figure 4. HPLC chromatograms of *Artemisia iwayomogi* Kitamura extracts.

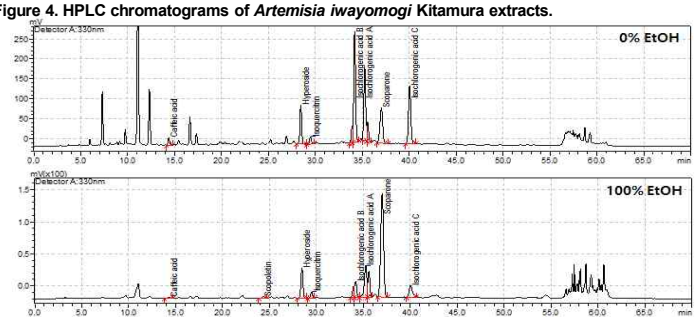


Table 2. Contents of marker compounds in *Artemisia capillaris* Thunb and *Artemisia iwayomogi* Kitamura extracts. Results are presented as the mean ± SD of 3 independent in triplicate.

Compound (μg/g)	Extraction	
	Distilled water	100% ethanol
Scoparone	57.36±0.45	138.19±3.46
Scopolin	4.62±0.09	
Chlorogenic acid	154.19±2.18	19.13±0.41
Caffeic acid	3.93±0.07	0.52±0.02
Scopoletin	-	1.70±0.05
Hyperoside	71.05±1.90	49.03±1.17
Isoquercitrin	14.42±0.33	10.26±0.26
Isochlorogenic acid B	114.89±1.59	14.72±0.64
Isochlorogenic acid A	61.86±1.18	28.83±0.62
Isochlorogenic acid C	79.36±2.52	18.26±0.36

Discussion

The amounts of both, chlorogenic acid and scoparone, are the highest amounts of them in ACT, but not detected in AIK. The highest amounts of two bioactive compounds, scopolin and scopoletin, among them were detected in AIK, and specifically the higher levels of scopolin were found in AIK compared to ACT. These results suggests that the comparative analysis of compositional components between ACT and AIK have to be useful as basic data for the purpose of the development of therapeutic agents or the commercialization of health functional foods.

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