Effects of *Eurya emarginata* on Anti-aging

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Abstract

Eurya emarginata (*E. emarginata*) is an evergreen tree that grows in warm area and is distributed in the southern regions of Korea such as Jollanam-do, Gyeongsangnam-do, Ulleungdo, Jeju-do. It has been used as a medicine for diuresis and phlegm removal, and previous studies have reported anti-inflammatory and anticancer effects. However, studies on antioxidant and anti-photoaging have not yet been reported. In this study, we investigated the effects of the *E. emarginata* leaf extract on antioxidant and anti-photoaging. The result of comparing the effects on the MMP-1 production of hot water extract (ELHW) and 70% ethanol extract (ELEE) in UVA-irradiated HDFn cells, the ELHW showed better inhibition of MMP-1 production even at a lower concentration than ELEE. In subsequent experiment, we fractionated ELHW and obtained the five fractions; hexane (Hex), chloroform ($CHCl_3$), ethyl acetate (EA), butanol (BuOH) and water (H_2O). As a result of comparing the antioxidant and MMP-1 production inhibitory effects of ELHW and five fractions, in the EA fr., the TPC and TFC were more than twice that of the ELEE, and the DPPH and ABTS radical scavenging activities were the best. Also, the EA fr. inhibited MMP-1 production the most. Additionally, we isolated three compounds from the EA fr.; Quercitrin (1), Eutigoside B (2), and Eutigoside C (3). Among the three compounds, Quercitrin showed excellent antioxidant activity and inhibition of MMP-1 production. Therefore, we suggest potential for use as a natural anti-aging agent of ELHW.

Material and Methods

1. Plant Material

- **Scientific name: *Eurya emarginata***
- **Family name: Theaceae**
- **Korean name: 우묵사스레피**
- **Distribution area: Korea, Japan**

Fig 1. The picture of *E. emarginata*

2. Extraction and Isolation

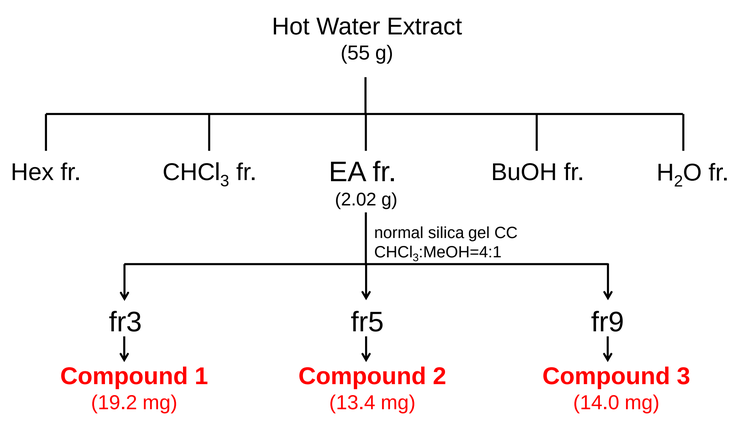


Fig 2. The diagram of isolation procedures for ELHW

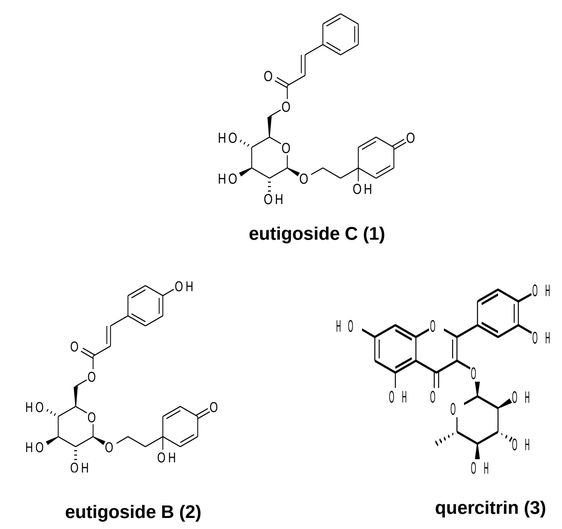
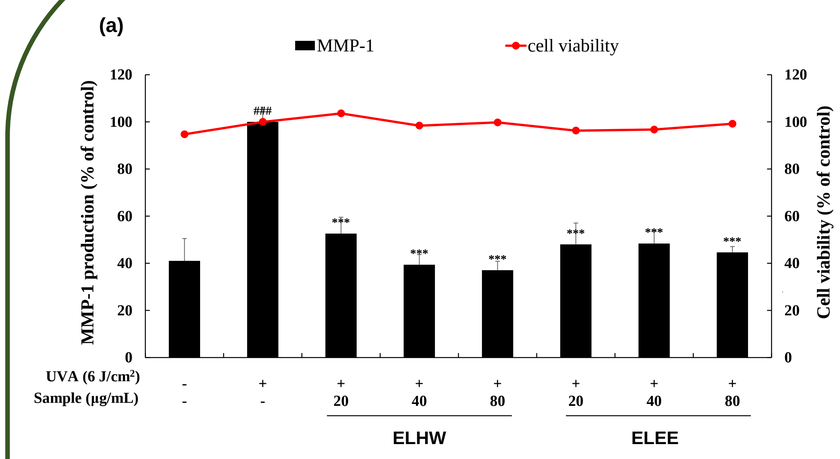


Fig 3. The structure of isolated compound 1-3 from ELHW

Results

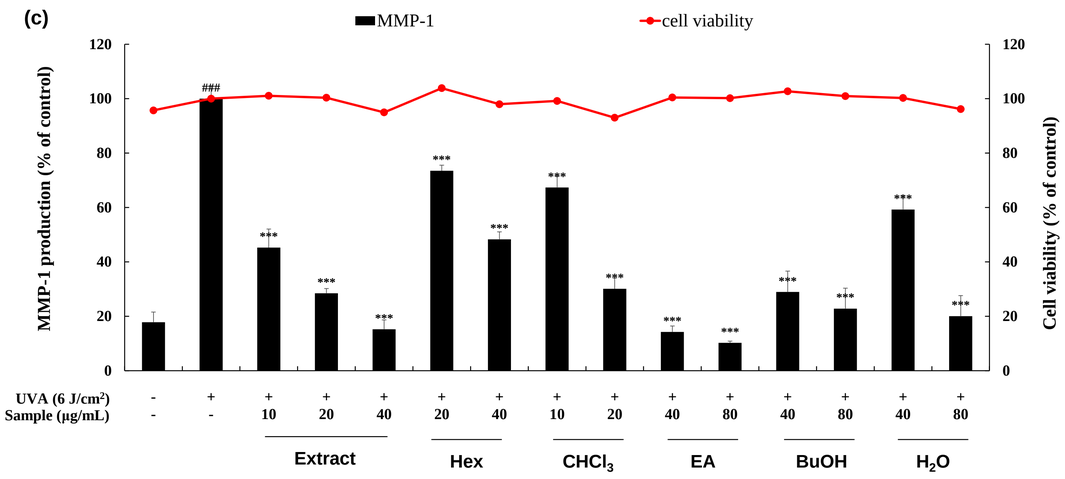


(b)

	TPC (mg GAE/g)	TFC (mg CE/g)	DPPH	ABTS
			IC_{50} value (μg/mL)	
ELHW	113.11	78.83	93.91±7.62	23.57±1.13
Hex fr.	71.53	49.47	N.D.	11.55±0.32
$CHCl_3$ fr.	83.63	65.47	N.D.	36.33±2.52
EA fr.	296.37	168.96	24.33±0.53	5.01±0.07
BuOH fr.	148.03	101.71	N.D.	22.88±0.67
H_2O fr.	51.23	47.04	N.D.	95.85±4.96
Ascorbic acid	-	-	3.09±0.06	2.80±0.22

(d)

compound		DPPH	ABTS
		IC_{50} value (μM)	
1	Eutigoside C	N.D.	49.88±10.37
2	Eutigoside B	N.D.	36.23±2.80
3	Quercitrin	46.09±1.00	10.10±0.11
-	Ascorbic acid	38.31±1.55	12.66±0.70



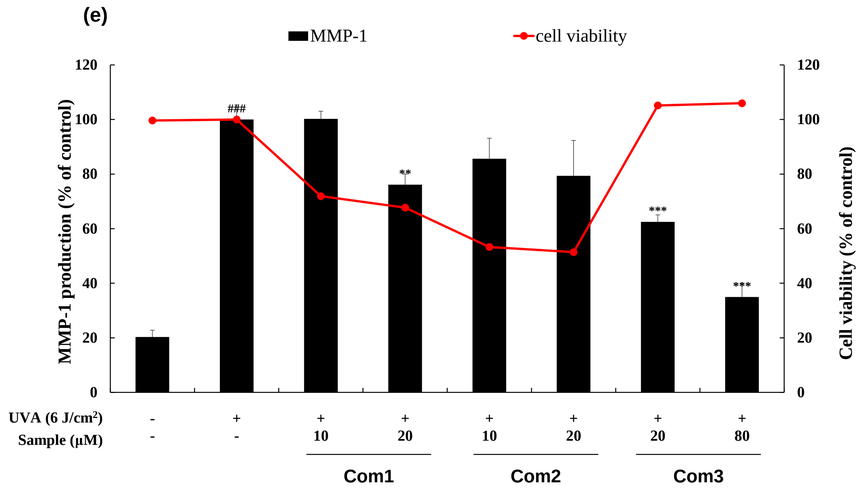


Figure 4. Anti-aging effects of *E. emarginata*. Effects of (a) ELHW and ELEE, (c) ELHW and solvent fractions, (e) compounds separated from EA fraction on MMP-1 production and cell viability in UVA-irradiated HDFn cells. The cells were treated with compounds at the indicated concentration for 24 h. ###$p < 0.001$ vs. untreated control, **$p < 0.01$ and ***$p < 0.001$ vs. negative control. Total polyphenol and flavonoid contents and DPPH, ABTS radical scavenging activity of (b) extract and solvent fractions and (d) compounds. Ascorbic acid was used as the positive control. GAE: gallic acid equivalents, CE: catechin equivalents, IC_{50}: concentration of required to scavenging 50% of DPPH and ABTS radicals, N.D.: Not detected.

Conclusion

- ✓ ELHW showed better inhibition of MMP-1 production than ELEE.
- ✓ As a result of comparing the antioxidant and MMP-1 production inhibition of ELHW and five fractions, in the EA fr., the TPC and TFC were more than twice that of the ELEE, and the DPPH and ABTS radical scavenging activities were the best.
- ✓ Among the three compounds, Quercitrin showed excellent antioxidant activity and inhibition of MMP-1 production.

[Acknowledgements] This research was financially supported by the Ministry of Trade, Industry and Energy, Korea, under the “Regional Innovation Cluster Development Program(R&D, P0015361)” supervised by the Korea Institute for Advancement of Technology(KIAT).