

Abstract

Schizophragma hydrangeoides (*S. hydrangeoides*) is a vine that grows attached to the foothills or rock surfaces of Jeju and Ulleungdo. This study confirmed the anti-oxidant activity and anti-wrinkle effects of 70% ethanol (EtOH) extract and solvent fractions of *S. hydrangeoides* leaves. Additionally, we found the major active compounds of butanol (BuOH) fraction, and investigated anti-wrinkle effect of the isolated compounds. The results showed that BuOH and ethyl acetate (EA) fractions have more contain total polyphenols and flavonoids than extracts. BuOH and EA fractions showed the good activities in DPPH and ABTS radical scavenging activity. Moreover, BuOH fraction showed the best inhibition of MMP-1 production without cytotoxicity in UVA-irradiated HDFn cells. To isolate the active ingredient, BuOH fraction was further purified to obtain four phytochemicals: neochlorogenic acid (1), quercetin-3-glucosyl-(1-2)-rhamnoside (2), quercetin-3-xylosyl-(1-2)-rhamnoside (3), quercitrin (4). Among the compounds isolated from BuOH, quercetin-3-glucosyl-(1-2)-rhamnoside (2) was identified as the main compound. As a result of confirming the MMP-1 inhibition rate of compound (1) ~ (4), quercetin-3-glucosyl-(1-2)-rhamnoside (2) inhibited the expressions of MMP-1 production without cytotoxicity. Based on these research results, we suggest that the possibility of developing a natural anti-oxidant and anti-wrinkle functional cosmetic material of *S. hydrangeoides*.

Material and Methods

1. Plant Material



Fig 1. The picture of *S. hydrangeoides*

- Scientific name: *Schizophragma hydrangeoides*
- Family name: Saxifragaceae
- Korean name: 바위수국
- Distribution area: Korea, Japan

2. Extraction and Isolation

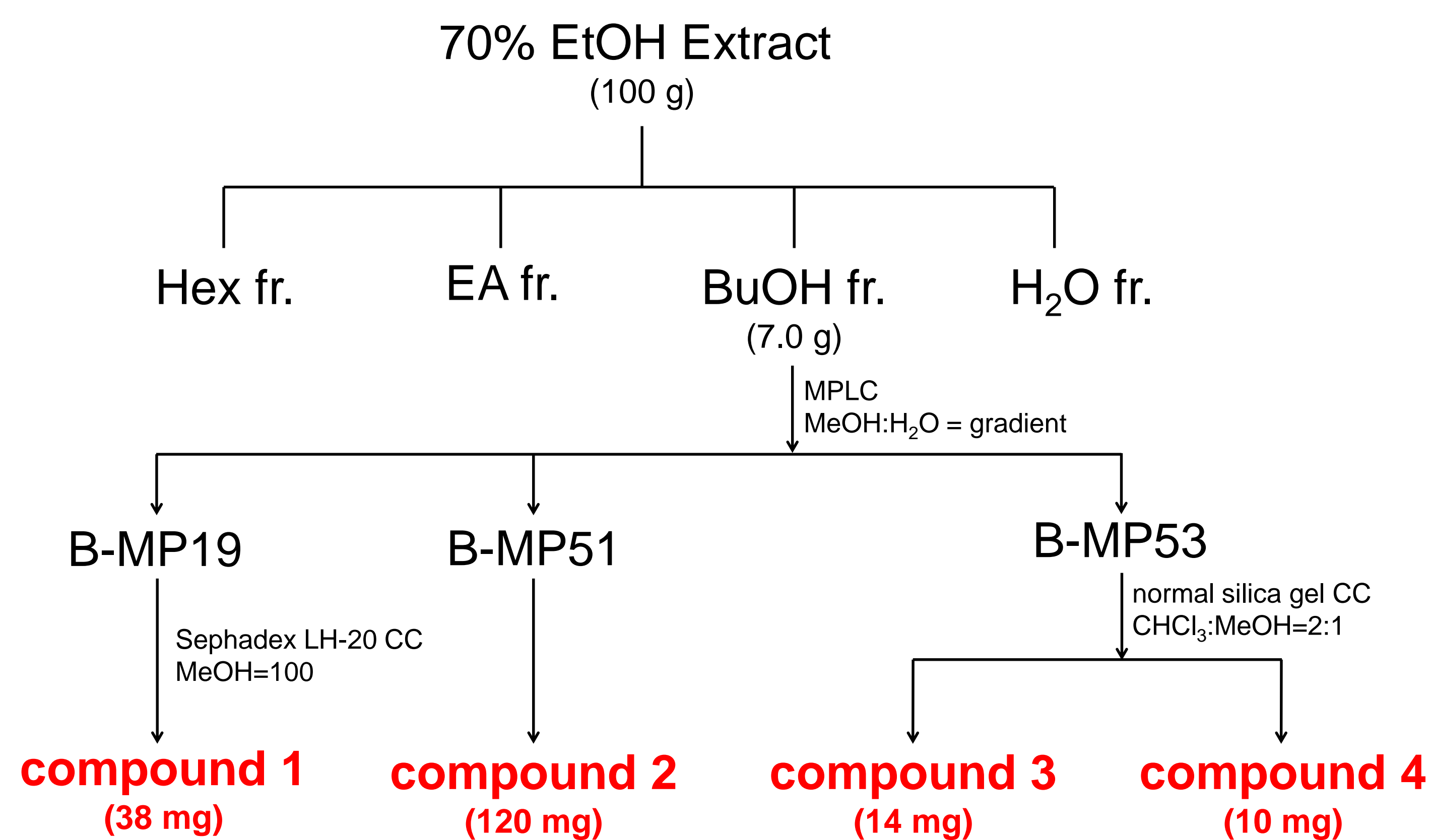


Fig 2. The diagram of isolation procedures for *S. hydrangeoides*

3. Anti-oxidant and Anti-wrinkle effects

1) Anti-oxidant effects screening

- Total polyphenol contents (TPC)
- Total flavonoid contents (TFC)
- DPPH radical scavenging activity assay
- ABTS radical scavenging activity assay

2) Anti-wrinkle effects screening

- MMP-1 production assay by ELISA

Results

1. Structure identification 2. HPLC chromatogram

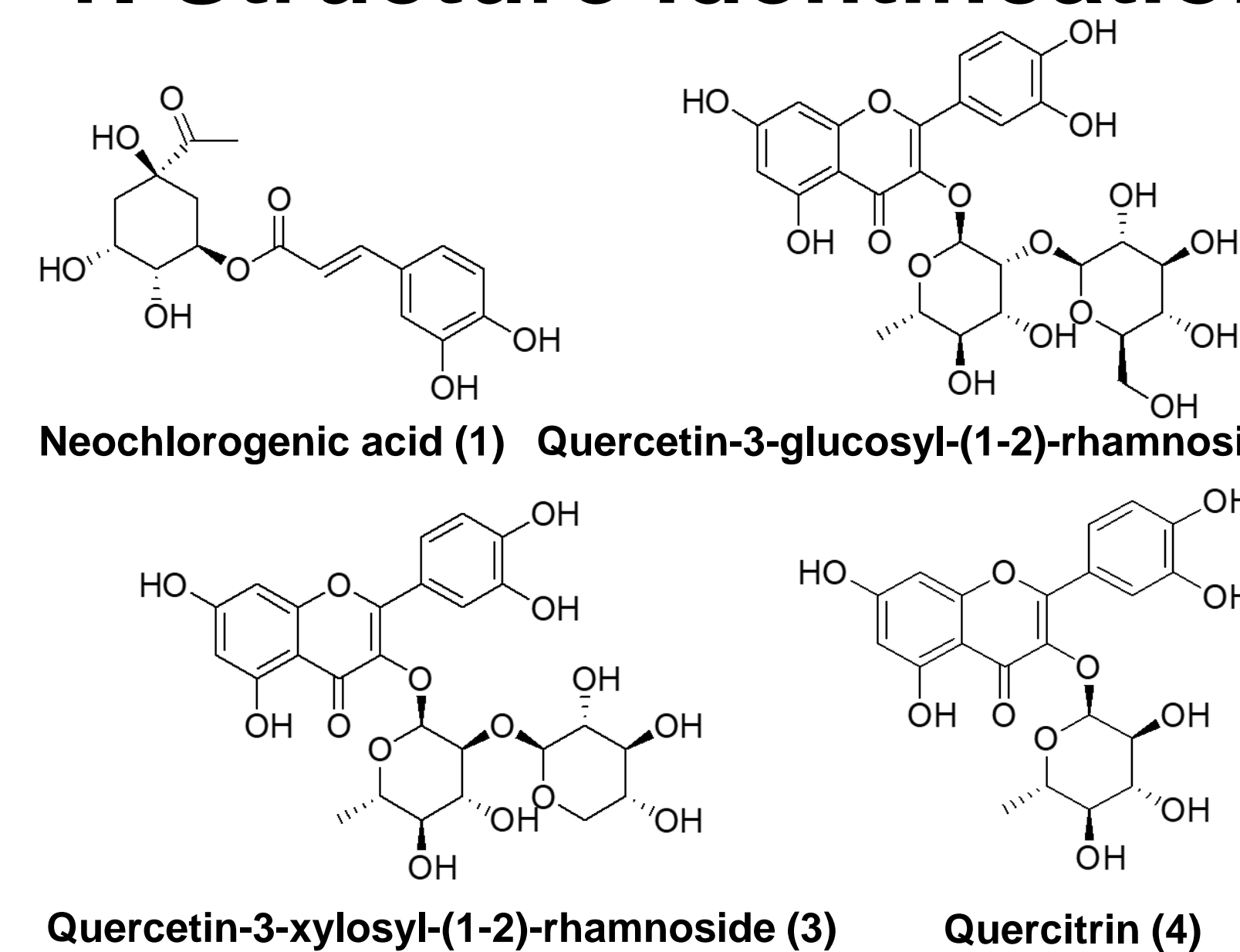


Fig 3. Chemical structures of compounds (1) ~ (4) isolated from *S. hydrangeoides*

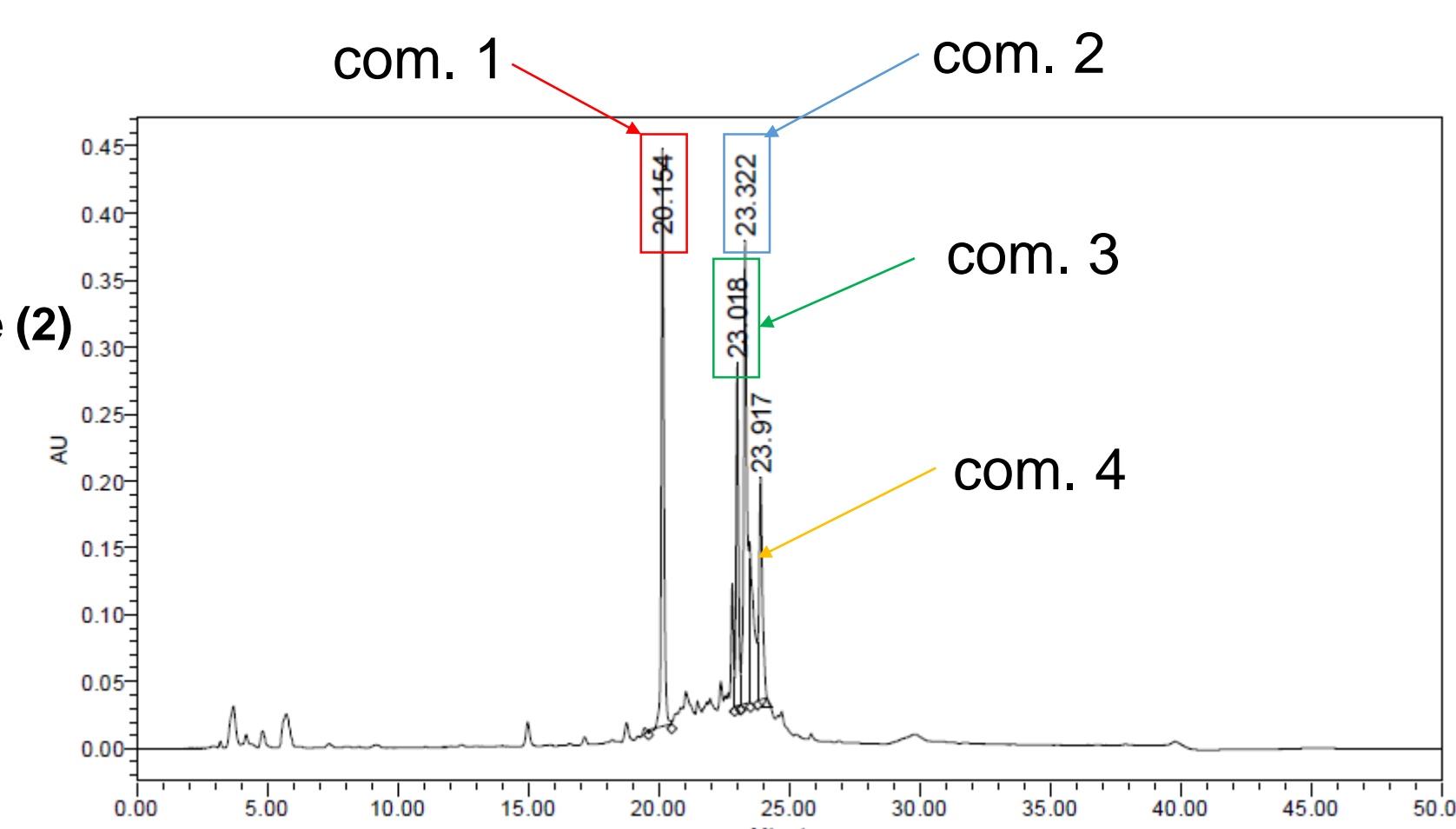


Fig 4. HPLC chromatogram of *S. hydrangeoides*

3. Anti-oxidant activity of *S. hydrangeoides*

	TPC (mg GAE/g)	TFC (mg CE/g)	DPPH	ABTS
			IC ₅₀ value (μg/mL)	
Extract	137.38±1.69	194.05±2.51	68.63±2.50	12.19±0.02
BuOH fr.	306.63±2.28	342.86±7.46	27.17±0.76	5.18±0.22
EA fr.	364.14±2.18	427.62±3.52	31.27±1.49	5.04±0.54
H ₂ O fr.	141.01±0.50	187.86±8.66	73.22±1.03	11.55±0.32
Hex fr.	88.52±0.41	N.D.	N.D.	21.49±0.4
Ascorbic acid	-	-	6.44±0.41	3.07±0.01

Table 1. Total polyphenol and flavonoid contents and DPPH, ABTS radical scavenging activity of extract and solvent fractions of *S. hydrangeoides*. Ascorbic acid was used as the positive control. GAE: gallic acid equivalents, CE: catechin equivalents, IC₅₀: concentration of required to scavenging 50% of DPPH and ABTS radicals, N.D.: Not detected.

4. Anti-wrinkle effects of *S. hydrangeoides*

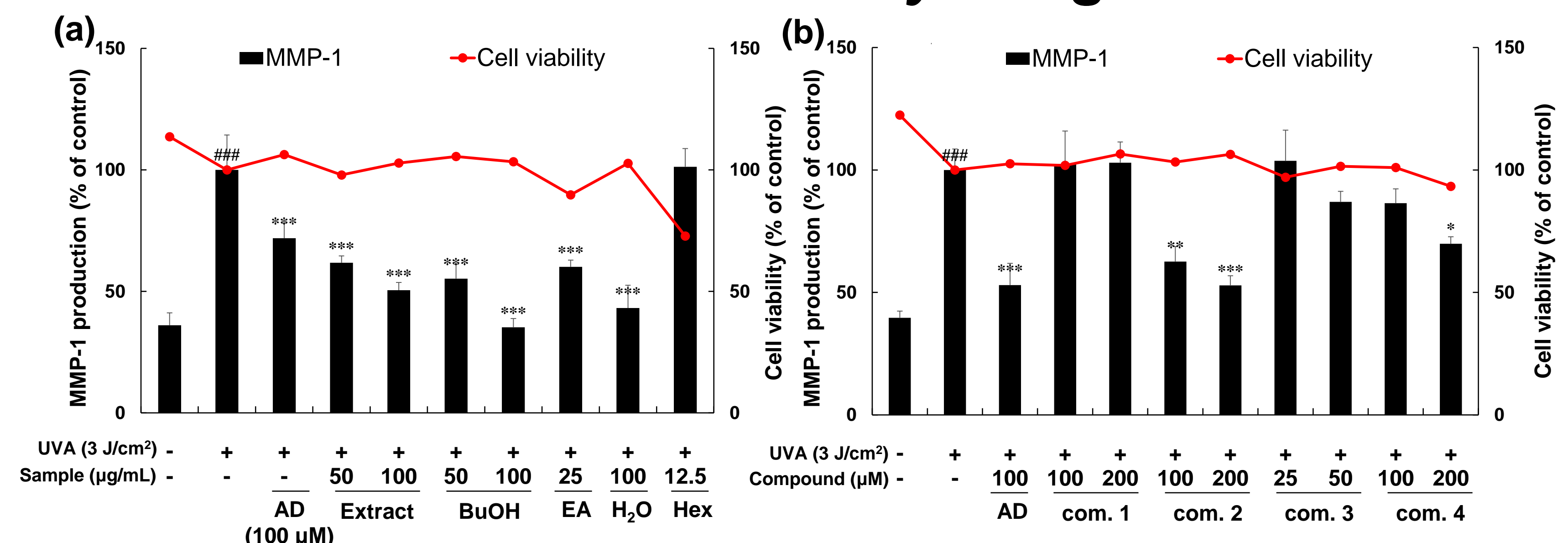


Figure 5. Effects of *S. hydrangeoides* on MMP-1 production and cell viability in UVA-irradiated HDFn cells. (a) extracts and solvent fractions of *S. hydrangeoides*, (b) compounds separated from BuOH fraction. The cells were treated with compounds at the indicated concentration for 24 h. Adenosine(AD) was used as the positive control. ###*p* < 0.001 vs. untreated control and **p* < 0.05, ***p* < 0.01 and ****p* < 0.001 vs. negative control.

Conclusion

- ✓ The results showed that we isolated the four phytochemicals from BuOH fr. of *S. hydrangeoides* extract.
- ✓ *S. hydrangeoides*, especially BuOH and EA fr., has great anti-oxidants activity and BuOH fr. showed the best inhibition of MMP-1 production.
- ✓ Com. 2, the main compound of BuOH fr., displayed better inhibition of MMP-1 production than other compounds.
- ✓ We suggest that the possibility of *S. hydrangeoides* as agents for anti-oxidant and anti-wrinkle functional cosmetic material.