SUPPLEMENTARY MATERIAL

Hepatoprotective phenylethanoid glycosides from *Cirsium setosum*

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Abstract: Two new phenylethanoid glycosides, namely β -D-glucopyranoside, 1''-O-(7S)-7-(3-methoxyl-4-hydroxyphenyl)-7-methoxyethyl-3''- α -L-rhamnopyranosyl-4''-[(8E)-7-(3-methoxyl-4-hydroxyphenyl)-8-propenoate] (**1**) and β -D-glucopyranoside, 1''-O-(7S)-7-(3-methoxyl-4-hydroxyphenyl)-7-methoxyethyl-3''- α -L-rhamnopyranosyl-4''-[(8E)-7-(4-hydroxyphenyl)-8-propenoate] (**2**), together with six phenylethanoid glycosides were isolated from *Cirsium setosum*. Their structures were elucidated by their spectroscopic data and references. Compounds **2**, **4**, **5**, **7**, and **8** (10 μ M) exhibited moderate hepatoprotective activities. Compounds (**3-8**) were obtained from this plant for the first time.

Keywords: *Cirsium setosum*; phenylethanoid glycoside; hepatoprotective activity

Contents:

Figure S1. Structures of compounds **1-8**

Figure S2. Key HMBC (H→C) , NOESY, and ^1H - ^1H COSY correlations of compounds **1** and **2**

Table S1. ^1H NMR (400 MHz, CD_3OD), ^{13}C NMR (100 MHz, CD_3OD), and HMBC correlations of compounds **1** and **2**

Table S2. Hepatoprotective effects of selective compounds (10 μM)

Figure S1. Structures of compounds 1-8

Figure S2. Key HMBC (H→C) , NOESY, and ¹H-¹H COSY correlations of compounds **1** and **2**

Table S1. ^1H NMR (400 MHz, CD_3OD), ^{13}C NMR (100 MHz, CD_3OD) and key HMBC correlations of compounds **1** and **2**

No.	1	2				
	δ_{H}	δ_{C}	HMBC(^1H - ^{13}C)	δ_{H}	δ_{C}	HMBC(^1H - ^{13}C)
1	-	130.9	-	-	130.7	-
2	6.79(1H,d,1.5)	113.6	-	6.81(1H,d,1.5)	113.5	-
3	-	148.7	-	-	149.0	-
4	-	147.1	-	-	146.9	-
5	6.68(1H,d,8.0)	116.7	-	6.67(1H,d,8.0)	116.5	-
6	6.63(1H,dd,8.0,1.5)	122.2	C-4	6.64(1H,dd,8.0,1.5)	122.3	C-4
7	4.46(1H,d,7.5)	83.4	C-2,C-6	4.46(1H,d,7.5)	83.6	C-2,C-6
8	3.95(2H,m)	72.9	-	3.96(2H,m)	73.1	-
1'	-	127.5	-	-	127.9	-
2'	7.16(1H,d,1.5)	111.6	-	7.40(2H,d,8.0)	132.0	C-4'
3'	-	149.3	-	6.78(2H,d,8.0)	117.8	-
4'	-	151.9	-	-	160.5	-
5'	6.80(1H,d,8.0)	117.0	-	6.78(2H,d,8.0)	117.8	-
6'	7.02(1H,dd,8.0,1.5)	123.9	C-4'	7.40(2H,d,8.0)	132.0	C-4'
7'	7.64(1H,d,15.8)	146.2	C-6', C-9'	7.63(1H,d,15.8)	147.1	C-6', C-9'
8'	6.39(1H,d,15.8)	116.0	-	6.40(1H,d,15.8)	115.8	-
9'	-	169.1	-	-	169.2	-
1''	4.56(1H,d,7.8)	103.8	C-8	4.53(1H,d,7.8)	103.9	C-8
2''	3.37(1H,m)	75.2	-	3.35(1H,m)	75.6	-
3''	3.60(1H,m)	83.3	-	3.58(1H,m)	83.6	-
4''	3.53(1H,m)	71.0	C-9'	3.53(1H,m)	71.1	C-9'
5''	3.56(1H,m)	75.4	-	3.57(1H,m)	75.6	-
6a''	3.93(1H,dd,11.5,2.4)	62.6	C-5''	3.94(1H,dd,11.5,2.4)	62.5	C-5''
6b''	3.68(1H,dd,11.5,5.6)	62.6	C-5''	3.68(1H,dd,11.5,5.6)	62.5	C-5''
1'''	5.01(1H,d,1.5)	101.8	C-3''	5.03(1H,d,1.5)	101.5	C-3''
2'''	3.68(1H,m)	72.3	-	3.67(1H,m)	72.3	-
3'''	3.70(1H,m)	72.4	-	3.71(1H,m)	72.5	-
4'''	3.39(1H,t,9.0)	74.0	-	3.40(1H,t,9.0)	73.9	-
5'''	3.96(1H,m)	70.1	-	3.95(1H,m)	70.3	-
6'''	1.24(3H,d,6.2)	18.1	-	1.24(3H,d,6.2)	18.2	-
3-OCH ₃	3.86(3H,s)	56.8	-	3.85(3H,s)	56.6	-
3'-OCH ₃	3.86(3H,s)	56.8	-	-	-	-
7-OCH ₃	3.23(3H,s)	56.5	-	3.24(3H,s)	56.6	-

Table S2. Hepatoprotective effects of selective compounds (10 μ M)

Compound	Cell survival rate (% of normal)	Inhibition (% of control)
normal	100.0 $\pm$ 4.5	-
control	51.1 $\pm$ 5.9	-
bicyclol	62.9 $\pm$ 7.2 ^a	24.1
2	67.7 $\pm$ 6.0 ^a	33.9
4	70.6 $\pm$ 3.6 ^a	39.9
5	61.0 $\pm$ 5.7 ^a	20.2
7	79.8 $\pm$ 7.1 ^a	58.7
8	75.2 $\pm$ 5.2 ^a	49.3

Results were expressed as means $\pm$ SD (n= 3; for normal and control, n = 6); bicyclol was used as positive control (10 μ M). ^ap< 0.05.