SUPLPLEMENTARY MATERIAL TO

**Chemical composition and antioxidant activity of *Astragalus monspessulanus* L.**

**growing in semiarid areas of Algeria**

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CHARACTERIZATION DATA FOR COMPOUNDS **2, 4**-**10**



Calendoside III (**2**)

*Isorhamnetin3-O-(4--L-rhamnopyranosyl)--D-glucopyranoside (Calendoside III) (****2****):* 1H NMR (500 MHz, MeOD, δ / ppm): 1.09 (3H, *d*, *J*= 6.2 Hz, H-6'''), 3.22 (1H, *t*, *J*= 9.8 Hz, H-4'''), 3.27 (1H, *dd*, *J1* = 9.3, *J2* = 7.3 Hz, H-4''), 3.40 (1H, *t*, *J*= 7.3 Hz, H-3''), 3.41 (1H, *ddd*, *J1*= 9.3, *J2*= 4.7, *J3* = 1.3 Hz, H-5''), 3.42 (1H, *m*, H-5'''), 3.46 (1H, *t*, *J*= 7.3 Hz, H-2''), 3,48 (1H, *dd*, *J1* = 9.8, *J2* = 3.4 Hz, H-3'''), 3.61 (1H, *dd*, *J1* = 3.4, *J2* =1.5 Hz, H-2'''), 3.80 (1H, *dd*, *J1* = 10.8, *J2* =1.3 Hz, H-6''a), 3.92 (1H, *dd*, *J1* = 10.8, *J2* = 4.7 Hz, H-6''b), 3.95 (3H, *s*, 3'-OMe), 4.52 (1H, *d*, *J*= 1.5 Hz, H-1'''), 5.25 (1H, *d*, *J*= 7.3 Hz, H-1''), 6.20 (1H, *d*, *J*= 2.1 Hz, H-6), 6.42 (1H, *d*, *J*= 2.1 Hz, H-8), 6.92 (1H, *d*, *J*= 8.6 Hz, H-5'), 7.64 (1H, *dd*, *J1* = 8.6, *J2* = 2.1 Hz, H-6'), 7.95 (1H, *d*, *J*= 2.1 Hz, H-2'); 13C NMR (125 MHz, MeOD, δ / ppm): 18.4 (CH3, C-6'''), 57.3 (CH3, 3'-OMe), 69.0 (CH2, C-6''), 70.3 (CH, C-5'''), 72.2 (CH, C-4''), 72.6 (CH, C-3'''), 72.8 (CH, C-2'''), 74.3 (CH, C-4'''), 76.4 (CH, C-2''), 78.7 (CH, C-3''), 95.4 (CH, C-8), 100.5 (CH, C-6), 103.1 (CH, C-1'''), 104.9 (CH, C-1''), 105.6 (C, C-10), 115.1 (CH, C-2'), 116.7 (CH, C-5'), 123.0 (C, C-1'), 124.5 (C, C-6'), 135.6 (C, C-3), 145.9 (C, C-3'), 148.9 (C, C-4'), 158.5 (C, C-9), 159.0 (C, C-2), 163.0 (C, C-5), 166.1 (C, C-7), 179.5 (C, C-4). ESI-MS (*m/z*, (relative abundance, %)): 779 ((C28H32O16+Na)+, 100).

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Kaempferol3-*O*-(4--L-rhamnopyranosyl)--D-glucopyranoside (**4**)

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*Kaempferol3-O-(4--L-rhamnopyranosyl)--D-glucopyranoside (****4****):* Yellow amorphous solid. 1H NMR (500 MHz, MeOD, δ / ppm): 0.95 (3H, *d*, *J*= 6.4 Hz, H-6'''), 3.20 (1H, *ddd*, *J1* = 9.1, *J2* = 6.2, *J3* = 2.2 Hz, H-5''), 3.28 (1H, *t*, *J*= 9.1 Hz, H-4''), 3.33 (1H, *t*, *J*= 9.2 Hz, H-4'''), 3.50 (1H, *dd*, *J1* = 12.0, *J2* = 6.2 Hz, H-6''a), 3.55 (1H, *t*, *J*= 9.1 Hz, H-3''), 3.61 (1H, *dd* , *J1*= 9.1, *J2* = 7.7 Hz, H-2''), 3.72 (1H, *dd*, *J1* = 12.0, *J2* = 2.2 Hz, H-6''b), 3.77 (1H, *dd*, *J1* = 9.2, *J2*= 3.4 Hz, H-3'''), 3.99 (1H, *dd*, *J1* = 3.4, *J2* = 1.6 Hz, H-2'''), 4,02 (1H, *dq*, *J1* = 9.2, *J2* = 6.4 Hz, H-5'''), 5.23 (1H, *d*, *J*= 1.6 Hz, H-1'''), 5.73 (1H, *d*, *J*= 7.7 Hz, H-1''), 6.15 (1H, *brs*, H-6), 6.34 (1H, *brs*, H-8), 6.88 (2H, *d*, *J*= 9.1 Hz, H-3', H-5'), 8.04 (2H, *d*, *J*= 9.1 Hz, H-2', H-6'); 13C NMR (125 MHz, MeOD, δ / ppm): 17.7 (CH3, C-6'''), 62.8 (CH2, C-6''), 70.1 (CH, C-5'''), 71.9 (CH, C-4''), 72.4 (CH, C-3'''), 72.6 (CH, C-2'''), 74.2 (CH, C-4'''), 79.2 (CH, C-3''), 80.3 (CH, C-2''), 94.6 (CH, C-8), 100.3 (CH, C-1''), 101.0 (CH, C-6), 102.8 (CH, C-1'''), 105.9 (C, C-10), 116.3 (CH, C-3', C-5'), 123.1 (C, C-1'), 132.2 (CH, C-2', C-6'), 134.4 (C, C-3), 158.4 (C, C-9), 158.5 (C, C-2), 161.6 (C, C-4'), 163.2 (C, C-5), 165.6 (C, C-7), 179.4 (C, C-4). ESI-MS (*m/z*, (relative abundance, %)): 617 ((C27H30O15+Na)+, 100).



Quercetin-3-*O*-(2,6--L-dirhamnopyranosyl--D-glucopyranoside (**5**)

*Quercetin-3-O-(2,6--L-dirhamnopyranosyl--D-glucopyranoside (****5****):*1H NMR (500 MHz, MeOD, δ / ppm): 1.00 (3H, *d*, *J*= 5.6 Hz, H-6'''), 1.08 (3H, *d*, *J*= 5.9 Hz, H-6''''), 3.24 (1H, *t*, *J*= 9.4 Hz, H-4''''), 3.28 (1H, *m*, H-4''), 3.32 (1H, *m*, H-4'''), 3.33 (1H, *m*, H-5''), 3.38 (1H, *m*, H-6''a), 3.43 (1H, *m*, H-5'''), 3.50 (1H, *dd*, *J1* = 9.4, *J2* = 3.4 Hz, H-3''''), 3.54 (1H, *t*, *J*= 8.8 Hz, H-3''), 3.58 (1H, *dd*, *J1* = 3.4, *J2* =1.6 Hz, H-2''''), 3.63 (1H, *dd*, *J1* = 8.8, *J2* = 7.8 Hz, H-2''), 3.81 (1H, *dd,J1* = 9.8, *J2* = 3.8 Hz, H-3'''), 3.83 (1H, *dd*, *J1* = 11.5, *J2* = 1.6 Hz, H-6''b), 4,01 (1H, *dd*, *J1* = 3.8, *J2* = 1.6 Hz, H-2'''), 4.07 (1H, *m*, H-5''''), 4.50 (1H, *d*, *J*= 1.6 Hz, H-1''''), 5.22 (1H, *d*, *J*= 1.6 Hz, H-1'''), 5.59 (1H, *d*, *J*= 7.8 Hz, H-1''), 6.19 (1H, *d*, *J*= 2.1 Hz, H-6), 6.37 (1H, *d*, *J*= 2.1 Hz, H-8), 6.87 (1H, *d*, *J*= 8.1 Hz, H-5'), 7.60 (1H, *dd*, *J1*= 8.1, *J2* = 2.1 Hz, H-6'), 7.62 (1H, *d*, *J*= 2.1 Hz, H-2');13C NMR (125 MHz, MeOD, δ / ppm): 17.6 (CH3, C-6'''), 17.9 (CH3, C-6''''), 68.4 (CH2, C-6''), 69.9 (CH, C-5''''), 70.1 (CH, C-5'''), 72.0 (CH, C-4''), 72.3 (CH, C-3'''), 72.4 (CH, C-2''', C-3''''), 72.5 (CH, C-2''''), 74.0 (CH, C-4''''), 74.2 (CH, C-4'''), 77.3 (CH, C-5''), 79.1 (CH, C-3''), 80.2 (CH, C-2''), 94.8 (CH, C-8), 99.9 (CH, C-6), 100.6 (CH, C-1''), 102.4 (CH, C-1''''), 102.8 (CH, C-1'''), 106.1 (C, C-10), 116.2 (CH, C-5'), 117.5 (CH, C-2'), 123.6 (C, C-1'), 123.7 (C, C-7'), 134.6 (C, C-3), 146.1 (C, C-3'), 149.7 (C, C-4'), 158.6 (C, C-9), 159.1 (C, C-2), 163.3 (C, C-5),165.8 (C, C-7), 179.5 (C, C-4). ESI-MS (*m/z*, (relative abundance, %)): 779 ((C33H40O20+Na)+, 100).



3',5'-di-*C*--D-glucopyranosylphloretin (**6**)

*3',5'-di-C--D-glucopyranosylphloretin (****6****):* Yellow amorphous powder. [*α*] D = + 83.6 (*c* = 1.0 g mL-1, MeOH). 1H NMR (500 MHz, MeOD, δ / ppm): 2.86 (2H, *m*, H-**), 3.34 (2H, *m*, H-**), 3.42 (2H, *m*, H-5'', H-5'''), 3.51 (2H, *t*, *J*= 9.4 Hz, H-3'', H-3'''), 3.53 (2H, *t*, *J*= 9.4 Hz, H-4'', H-4'''), 3.62 (2H, *t*, *J*= 9.4 Hz, H-2'', H-2'''), 3.82 (2H, *dd*, *J1* = 12.5, *J2*= 2.0 Hz, H-6''a, H-6'''a), 3.86 (2H, *dd*, *J1*= 12.5, *J2* = 2.0 Hz, H-6''b, H-6'''b), 4.94 (2H, *d*, *J*= 9.4 Hz, H-1'', H-1'''), 6.67 (2H, *d*, *J*= 8.5 Hz, H-3, H-5), 7.04 (1H, *d*, *J*= 8.5 Hz, H-2, H-6);13C NMR (125 MHz, MeOD, δ / ppm): 31.3 (CH2, C-**), 48.0 (CH2, C-**), 62.1 (CH2, C-6'', C-6'''), 71.2 (CH, C-4'', C-4'''), 74.3 (CH, C-2'', C-2'''), 76.9 (CH, C-1'', C-1'''), 79.3 (CH, C-3'', C-3'''), 82.9 (CH, C-5'', C-5'''), 104.6 (C, C-3', C-5'), 106.2 (C, C-1'), 116.3 (CH, C-3, C-5), 130.6 (CH, C-2, C-6), 134.1 (C, C-1), 156.6 (C, C-4), 162.2 (C, C-2', C-6'), 163.1 (C, C-4'), 207.2 (C, C=O). ESI-MS (*m/z*, (relative abundance, %)): 597 ((C27H34O15-H)-, 100).



Isolariciresinol 9'-*O*--D-glucopyranoside (**7**)

*Isolariciresinol 9'-O--D-glucopyranoside (****7****)*: White amorphous powder. [*α*] D = + 16 (*c* = 0.9 g mL-1, MeOH /CH2Cl2 (1/0.5)). 1H NMR (500 MHz, DMSO-*d6*, δ / ppm): 1.72 (1H, *m*, H-8'), 1,91 (1H, *m*, H-8), 2.72 (2H, *d*, *J*= 8.0 Hz, H-7), 2.96 (1H, *m*, Ha-9'), 2.97 (1H, *t*, *J*= 7.8 Hz, H-2''), 3.01 (1H, *ddd*, *J1*= 9.3, *J*2 = 4.7, *J3 =* 2.6 Hz, H-5''), 3.03 (1H, *dd*, *J1* = 9.3, *J*2 = 7.8 Hz, H-4''), 3.13 (1H, *t*, *J* = 7.8 Hz, H-3''), 3.41 (1H, *dd*, *J1*= 11.7,*J2* = 2.6 Hz, H-6''a), 3.45 (1H, *m*, H-9a); 3.57 (1H, *m*, H-9b), 3.63 (1H, *dd*, *J1* = 11.7,*J*2 = 4.7 Hz, H-6''b), 3.71 (6H, *s*, 5-OMe/3'-OMe), 3.90 (1H, *dd*, *J1* = 9.8, *J*2 = 1.9 Hz, H-9'b), 3.95 (1H, *d*, *J*= 7.8 Hz, H-1''), 4.03 (1H, *d*, *J* = 10.7 Hz, H-7'), 6.08 (1H, *brs*, H-3), 6.50 (1H, *dd*, *J1*= 8.2, *J2* = 1.8 Hz, H-6'), 6.61 (1H, *brs*, H-6 ), 6.68 (1H, *d*, *J* = 8.2 Hz, H-5'), 6.80 (1H, *d*, *J* = 1.8 Hz, H-2'); 13C NMR (125 MHz, DMSO-*d6*, δ / ppm): 32.5 (CH2, C-7), 37.5 (CH, C-8), 44.1 (CH, C-8'), 45.5 (CH, C-7'), 55.5 (5-OMe), 55.6 (3'-OMe), 61.0 (CH2, C-6''), 62.8 (CH2, C-9), 67.6 (CH2, C-9'), 70.0 (CH, C-4''), 73.3 (CH, C-2''), 76.7 (CH, C-5''), 76.8 (CH, C-3''),104.1 (CH, C-1''), 111.8 (CH, C-6), 113.9 (CH, C-2'),115.5 (CH, C-5'), 116.2 (CH, C-3),121.1 (CH, C-6'), 127.0 (C, C-1), 132.7 (C, C-2), 136.9 (C, C-1'), 144.0 (C, C-4), 144.5 (C, C-5, C-4'), 147.1 (C, C-3'). ESI-MS (*m/z*, (relative abundance, %)): 545 ((C26H34O11+Na)+, 100).



Hovetrichoside C (**8**)

*Hovetrichoside C (****8****):* Amorphous powder. [*α*]25D = -54.1 (*c* = 1.9 g mL-1, MeOH). *(****Major****)*: 1H NMR (500 MHz, DMSO-*d6*, δ / ppm): 2.90 (2H, *m*, H-1'), 3.17 (1H, *m*, H-4''), 3.19 (1H, *m*, H-3''), 3.24 (1H, *m*, H-2''), 3.25 (1H, *m*, H-5''), 3.47 (1H, *m*, H-6''a), 3.61 (1H, *m*, H-6''b), 4.90 (1H, *d*, *J*= 8.2 Hz, H-1''), 5.93 (1H, *d*, *J*= 1.8 Hz, H-7), 6.00 (1H, *d*, *J*= 1.8 Hz, H-5), 6.55 (2H, *d*, *J*= 7.1 Hz, H-4', H-6'), 6.92 (2H, *d*, *J*= 7.1 Hz, H-3', H-7');13C NMR (125 MHz, DMSO-*d6*, δ / ppm): 40.4 (CH2, C-1'), 60.4 (CH2, C-6''), 69.3 (CH, C-4''), 72.9 (CH, C-2''), 76.7 (CH, C-3''), 77.2 (CH, C-5''), 91.5 (CH, C-7), 95.2 (CH, C-5), 99.4 (CH, C-1''), 101.9 (C, C-9), 105.5 (C, C-2), 114.7 (CH, C-4', C-6'), 124.1 (C, C-2'), 131.3 (CH, C-3', C-7'), 155.9 (C, C-5'), 156.7 (C, C-4), 168.4 (C, C-6), 171.9 (C, C-8), 192.4 (C, C-3). ESI-MS (*m/z*, (relative abundance, %)): 449 ((C21H22O11-H)-, 100).

*(****Minor****)*: 1H NMR (500 MHz, DMSO-*d6*, δ / ppm): 2.90 (2H, *m*, H-1'), 3.17 (1H, *m*, H-4''), 3.19 (1H, *m*, H-3''), 3.24 (1H, *m*, H-2''), 3.25 (1H, *m*, H-5''), 3.47 (1H, *m*, H-6''a), 3.61 (1H, *m*, H-6''b), 4.98 (1H, *d*, *J*= 8.2 Hz, H-1''), 5.93 (1H, *d*, *J*= 1.8 Hz, H-7), 6.05 (1H, *d*, *J*= 1.8 Hz, H-5), 6.55 (2H, *d*, *J*= 7.1 Hz, H-4', H-6'), 6.92 (2H, *d*, *J*= 7.1 Hz, H-3', H-7');13C NMR (125 MHz, DMSO-*d6*, δ / ppm): 40.4 (CH2, C-1'), 60.3 (CH2, C-6''), 69.2 (CH, C-4''), 73.0 (CH, C-2''), 76.7 (CH, C-3''), 77.1 (CH, C-5''), 91.7 (CH, C-7), 95.7 (CH, C-5), 99.2 (CH, C-1''), 101.9 (C, C-9), 105.5 (C, C-2), 114.7 (CH, C-4', C-6'), 124.1 (C, C-2'), 131.3 (CH, C-3', C-7'), 155.9 (C, C-5'), 156.7 (C, C-4), 168.4 (C, C-6), 171.9 (C, C-8), 192.7 (C, C-3).



Soyasaponin I (**9**)

*SoyasaponinI (****9****):* White amorphous solid. [*α*]20 D = - 12 (*c* = 0.9 g mL-1, MeOH). 1H NMR (500 MHz, DMSO-*d6*, δ / ppm): 0.83 (3H, *s*, H-28), 0.92 (3H, *s*, H-30), 0.93 (1H, *m*, H-5), 0.95 (1H, *m*, H-19a), 0.98 (3H, *s*, H-26), 1.01 (1H, *m*, H-1a), 1.03 (3H, *s*, H-29), 1.04 (2H, *m*, H-2a), 1.13 (3H, *s*, H-27), 1.24 (3H, *s*, H-23), 1.27 (3H, *d*, *J*= 8.6 Hz, H-6'''), 1.29 (2H, *m*, H-16a, H-16b), 1.32 (1H, *m*, H-21b), 1.36 (2H, *m*, H-6a), 1.44 (1H, *m*, H-21a), 1.42 (1H, *m*, H-7a), 1.54 (1H, *m*, H-7b), 1.57 (1H, *m*, H-9), 1.63 (2H, *m*, H-6b), 1.65 (1H, *m*, H-1b), 1.76 (2H, *m*, H-2b), 1.75 (1H, *m*, H-19b), 1.86 (2H, *m*, H-15a, H-15b), 1.87 (2H, *m*, H-11a, H-11b), 2.07 (1H, *d*, *J* = 14.7 Hz, H-18), 3.22 (1H, *d*, *J* = 11.3 Hz, H-24a), 3.37 (1H, *dd*, *J1*= 5.1, *J*2 = 3.5 Hz, H-22), 3.40 (1H, *dd*, *J1* = 10.3, *J*2 = 3.5 Hz, H-3), 3.42 (1H, *t*, *J* = 9.6 Hz, H-4'''), 3.46 (1H, *t*, *J* = 9.4 Hz, H-4'), 3.48 (1H, *m*, H-5''), 3.54 (1H, *dd*, *J1* = 9.5,*J*2 = 3.1 Hz, H-3''), 3.61 (1H, *d*, *J* = 7.9 Hz, H-5'), 3.62 (1H, *dd*, *J1* = 9.5; *J*2 = 7.5 Hz, H-2''), 3.64 (1H, *dd*, *J1* = 9.4, *J2* = 7.9 Hz, H-3'), 3.72 (1H, *dd*, *J1*= 9.6, *J2* = 3.5 Hz, H-3'''), 3.72 (1H, *m*, H-6''a/H-6''b), 3.74 (1H, *dl*, *J* = 3.1 Hz, H-4''), 3.76 (1H, *d*, *J* = 7.9 Hz, H-2'), 3.92 (1H, *dd*, *J1*= 3.5; *J2* = 1.9 Hz, H-2'''), 4.12 (1H, *m*, H-5'''), 4.13 (1H, *d*, *J* = 11.3 Hz, H-24b), 4.45 (1H, *d*, *J* = 7.9 Hz, H-1'), 4.87 (1H, *d*, *J* = 7.5 Hz, H-1''), 5.14 (1H, *d*, *J*= 1.9 Hz, H-1'''), 5.25 (2H, *t*, *J* = 3.3 Hz, H-12); 13C NMR (125 MHz, DMSO-*d6*, δ / ppm): 16.6 (CH3, C-25), 17.7 (CH3, C-26), 18.5 (CH3, C-6'''), 19.5 (CH2, C-6), 20.6 (CH3, C-28), 23.6 (CH3, C-23), 25.0 (CH2, C-11), 25.6 (CH3, C-27), 27.0 (CH2, C-2), 27.3 (CH2, C-15), 29.2 (CH3, C-29), 30.0 (CH2, C-16), 31.5 (C, C-20), 32.7 (CH3, C-30), 34.5 (CH2, C-7), 37.6 (C, C-10), 38.7 (C, C-17), 39.8 (CH2, C-1), 40.9 (C, C-8), 42.3 (CH2, C-21), 43.5 (C, C-14),44.9 (C, C-4), 46.9 (CH, C-18), 47.6 (CH2, C-19), 47.9 (CH, C-9), 57.5(CH, C-5), 62.3 (CH2, C-6''), 64.5 (CH2, C-24), 69.6 (CH, C-5'''), 71.7 (CH, C-3'''), 72.3 (CH, C-4'', C-2'''), 74.3 (CH, C-4'), 74.4 (CH, C-4'''), 76.4 (CH, C-3''), 76.5 (CH, C-5''), 77.1 (CH, C-22), 77.3 (CH, C-2', C-5'), 78.2 (CH, C-3'), 78.5 (CH, C2''), 92.7 (CH, C-3), 102.4 (CH, C-1''), 102.5 (CH, C-1'''), 105.7 (CH, C-1'), 123.8 (CH, C-12), 145.4 (C, C13), 175.6 (C, COOH). ESI-MS (*m/z*, (relative abundance, %)): 965 ((C48H78O18+Na)+, 100).



Dehydrosoyasaponin I (**10**)

*Dehydrosoyasaponin I (****10****):* White amorphous solid. [*α*] D = -15.2 (*c* = 0.23 g mL-1, MeOH). 1H NMR (600 MHz, CD3OD, δ / ppm): 0.87 (3H, *s*, H-30), 0.92 (3H, *s*, H-25), 0.96 (1H, *m*, H-5), 1.00 (3H, *s*, H-26), 1.01 (3H, *s*, H-28), 1.03-1.66 (1H, *m*, H-1), 1.03 (3H, *s*, H-29), 1.12-2.17 (2H, *m*, H-16), 1.29 (3H, *s*, H-23), 1.30 (3H, *s*, H-27), 1.30 (3H, *d*, *J*= 8.6 Hz, H-6'''), 1.33-1.85 (2H, *m*, H-15), 1.34 (1H, *m*, H-19a), 1.39-1.66 (2H, *m*, H-6), 1.40-1.68 (1H, *m*, H-7), 1.64 (1H, *m*, H-9), 1.8-1.13 (2H, *m*, H-2), 1.92 (2H, *m*, H-11a, H-11b), 1.99-2.59 (1H, *m*, H-21), 2.23 (1H, *t,J* = 13,8 Hz, H-19b), 2.37 (1H, *dd*, *J1*= 13.8, *J2* = 3.8 Hz, H-18), 3.23 (1H, *d*, *J* = 11.5 Hz, H-24a), 3.42 (1H, *dd*, *J1* = 10.3, *J2* = 4.5 Hz, H-3), 3.42 (1H, *t*, *J*= 9.6 Hz, H-4'''), 3.46 (1H, *t,J*= 9.2 Hz, H-4'), 3.51 (1H, *m*, H-5''), 3.56 (1H, *dd*, *J1* = 9.6; *J2* = 3.5 Hz, H-3''), 3.61 (1H, *d*, *J* = 9.2 Hz, H-5'), 3.62 (1H, *dd*, *J1* = 9.2, *J2* = 8.3 Hz, H-3'), 3.66 (1H, *dd*, *J1* = 9.6,*J2* = 7.5 Hz, H-2''), 3.72 (1H, *m*, H-6''b), 3.73 (1H, *nd*, H-3'''), 3.74 (1H, *nd*, H-4''), 3.76 (1H, *m*, H-6''a), 3.78 (1H, *d*, *J*= 8.3 Hz, H-2'), 3.94 (1H, *dd*, *J1* = 3.3; *J2* = 1.6 Hz, H-2'''), 4.12 (1H, *m*, H-5'''), 4.16 (1H, *d*, *J*= 11.5 Hz, H-24b), 4.48 (1H, *d*, *J*= 8.3 Hz, H-1'), 4.90 (1H, *d*, *J*= 7.5 Hz, H-1''), 5.15 (1H, *d*, *J*= 1.6 Hz, H-1'''), 5.35 (2H, *t*, *J*= 3.5 Hz, H-12);13C NMR (150 MHz, CD3OD, δ / ppm): 14.9 (CH3, C-25), 15.9 (CH3, C-26), 16.9 (CH3, C-27, C-6'''), 18.0 (CH2, C-6), 19.7 (CH3, C-28), 22.0 (CH3, C-23), 23.5 (CH2, C-11), 24.2 (CH3, C-30), 24.8 (CH2, C-2), 25.7 (CH2, C-15), 27.0 (CH2, C-16), 30.8 (CH3, C-29), 32.6 (CH2, C-7), 33.7 (C, C-20), 36.1 (C, C-10), 38.3 (CH2, C-1), 39.4 (C, C-8), 41.6 (C, C-14), 43.3 (C, C-4), 46.2 (CH2, C-19), 47.6 (CH, C-18), 47.3 (CH, C-9), 48.0 (C, C-17), 50.3 (CH2, C-21), 55.9 (CH, C-5), 60.8 (CH2, C-6''), 62.9 (CH2, C-24), 68.1 (CH, C-5'''), 70.3 (CH, C-3'''), 70.8 (CH, C-4'', C-2'''), 72.8 (CH, C-4', C-4'''), 74.9 (CH, C-3''), 75.7 (CH, C-5''), 75.8 (CH, C-2', C-5'), 76.9 (CH, C-3'), 77.8 (CH, C2''), 91.0 (CH, C-3), 100.7 (CH, C-1''), 100.9 (CH, C-1'''), 104.1 (CH, C-1'), 123.7 (CH, C-12), 141.4 (C, C13), 175.6 (C, COOH), 218.3 (CH, C-22). ESI-MS (*m/z*, (relative abundance, %)): 963 ((C48H76O18+Na)+, 100).

SPECTRUM DATA FOR COMPOUNDS 6 AND 8



Fig. S1. 1H-NMR for compound 6



Fig. S2. 13C-NMR for compound 6



Fig. S3. 1H-NMR for compound 8

DPPH RADICAL SCAVENGING ASSAY

The free radical scavenging activity of *n*-butanol extract of *Astragalus monspessulanus* L. was measured *in vitro* by 1,1-Diphenyl-2-picrylhydrazyl (DPPH) according to the procedure described by (Saeed *et al.* 2012).1The stock solution was prepared by dissolving 2.5 mg DPPH with 100 ml methanol and stored at 20°C until required. The working solution was obtained by diluting DPPH solution with methanol to attain an absorbance of about 0.98±0.02 at 517 nm using the spectrophotometer. A 3 ml aliquot of this solution was mixed with 100μl of the sample at various concentrations. The reaction mixture was shaken well and incubated in the dark for 30 min at room temperature. Then the absorbance was taken at 517nm. Ascorbic acid was used as reference compound. The scavenging activity was estimated based on the percentage of DPPH radical scavenged as the following equation:

$Scavenging activity \left(\%\right)=\left(\frac{A^{control}- A ^{sample}}{A ^{control}}\right)×100 $(1)

The antiradical activity of tested extract is expressed as a relative or absolute decrease of concentration of DPPH or as *IC50* (concentration of extract decreasing the absorbance of the DPPH solution by 50 %).

FERROUS ION CHELATING ASSAY

The ferrous ion chelating (FIC) activity of *n*-butanol extract of *Astragalus monspessulanus* L. was performed to determine the inhibition of the formation of iron(II)–ferrozine complex after treatment of test material with Fe2+, according to the procedure described by (Decker and Welch, 1990).2The reaction mixture(1.50 ml) contained 500 l test material (*n*-butanol extract(0–35 mg) or Na2EDTA. 2H2O (0–25 g)), 100 l FeCl2(0.6 mM in water) and 900 μl methanol. The control contained all the reaction reagents except the extract and EDTA. The mixture was incubated at room temperature for 5 min. Next, one hundred microliters of ferrozine (5 mM in methanol) was added, mixed thoroughly and left in the dark for another 10 min to complex the residual Fe2+ ion. The absorbance of the solution was measured spectrophotometrically at 562 nm against a methanol blank. The percentage inhibition of ferrozine-Fe2+ formations was calculated, using the equation (2).

$Chelating effect \left(\%\right)=\left(1- \frac{A^{Sample}}{A^{Control}}\right) ×100 $(2)

The *EC50* value (µg/mL), which is the concentration of the extract/standard that chelate 50% of the ferrous ion, was calculated through linear interpolation between values above and below 50% activity.

REFERENCES

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2. E. A.Decker, B.Welch, *Journal of Agricultural and Food Chemistry*. **36**(1990) 674



Fig. S4. DPPH radical scavenging activity *of Astragalus monspessulanus n*-BuOH extract. The Data was represented as Mean (n=3)



Fig. S5. DPPH radical scavenging activity of ascorbic acid



Fig. S6. Ferrous ion chelating activity of *Astragalus monspessulanus n*-BuOH extract.The Data was represented as Mean (n=3)



Fig. S7. Ferrous ion chelating activity of EDTA