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A NEW BIFLAVONOID FROM *LONICERA SEMPERVIRENS*

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ABSTRACT

Phytochemical investigation of both the chloroform and ethyl acetate extracts of *Lonicera sempervirens* led to the isolation of seven compounds identified as betulin **1**, a new flavonoid compound named (lonisemperin) scutellarein-(6-*O*-3')-acacetin **2**, luteolin **3**, ß-sitosterol 3-*O*-β-D-glucoside **4**, from the chloroform extract and acacetin-7-*O*-β-D-glucoside **5**, luteolin-7-*O*- β-D-glucoside **6** and apigenin-7-*O*- β-D-neohesperidoside **7**, from the ethyl acetate extract. The isolated compounds were identified according to their chemical and spectral data. The antifungal activity of the extracts and some of the isolated compounds were performed using *Aspergillus parasiticum* which secrets aflatoxines

INTRODUCTION

Lonicera sempervirens (trumpet Honeysuckle) is a wild plant, belongs to family *Caprifoliaceae*. The genus *Lonicera* (Honeysuckle) comprises 200 species of evergreen and deciduous flowering shrubs and woody climbers. The flowers are basically tubular with diverging lips. Those of the climber are often fragrant[1]. It is native to south-eastern USA, but widely cultivated and escaping elsewhere.

The herbage of Honeysuckles is a favourate food of goats, therefore, the latin name Caprifolium (goat's leaf). The French chevrefeuille, German geißblatt and Italian capri-foglio, all signifying the same. The berries have been used as food for chicken. Some species of *Lonicera* are used in Chinese and Korean herbal medicine for their antipyretic, detoxicant and anti-inflammatory actions[2,3] and for treatment of hepatitis and stomatitis[4]. Others were used as anti-bacterial and anti-viral to treat fever, dysentry, enteritis, pneumonia, encephalitis, and influenza[5].

Genus *Lonicera* is characterized by its contents of flavonoids, irridoids, triterpenoids[2,4,6-8]. On reviewing the appropriate literature, it was apparent that there are no previous scientific reports on *Lonicera sempervirens*, therefore it was considered to be of interest to carry out the present study on this plant.

EXPERIMENTAL

Plant material:

The aerial parts of *L. sempervirens* were collected at the flowering stage from the wild plants growing at Mansoura area during the period from April to May, 2002. The plant material was identified by Dr. I. Mashaly, Department of Botany, Faculty of Science, Mansoura University. A voucher specimen documenting this collection has been deposited at the Pharmacognosy Department, Faculty of Pharmacy, Mansoura University.

General experimental procedure:

CC silica gel Merk, 70-230 mesh. TLC silica gel 60 F_{254} precoated plates (E-Merk, Germany). UV spectra: Beckmann DU-7 spectrophotometer. IR spectra: Nicolet, Mx-1 FT-IR spectrophotometer, USA. ^{1}H-, ^{13}C-, and COSY NMR spectra: JEOL spectrometer, 400 and 500 MHz

Extraction and isolation:

The air-dried powdered leaves of *Lonicera sempervirens* (1.7 kg) were extracted with methanol till exhaustion. The methanolic extract (200 gm) was concentrated in a rotary evaporator at 40°C to 200 ml, diluted with distilled water (100 ml) and successively extracted with petroleum ether, chloroform, ethyl acetate and *n*-butanol. The chloroform extract (20 g) was loaded on a silica gel packed column (5×100 cm, 300 g) then gradiently eluted with $CHCl_3$ containing increasing propotions of MeOH. Fractions of 500 ml were collected, concentrated and monitored by TLC on scilia gel G plates using $CHCl_3$–MeOH (9.5:0.5), (9:1) or (8:2) as solvents systems and vanillin-H_2SO_4 and KOH as spray reagents. Similar fractions were pooled together and concentrated to give four fractions A, B, C and D. Each fraction was purified on a another column of silica gel using the same eluting system to affored pure compounds **1** (40 mg), **2** (30 mg), **3** (30 mg) and **4** (25 mg). The ethyl acetate extract was applied as a band on a silica gel column. Elution was performed using $CHCl_3$–MeOH-H_2O with increasing polarity (90:10:1), (80:20:2) and (70:30:3). Fractions of 100 ml were collected together and concentrated to affored four fractions. Each one was purified on a silica gel column using EtOAc-MeOH-H_2O with increasing proportions to affored four compounds **5** (8 mg), **6** (7 mg), **7** (9 mg).

Antifungal activity:

The phytopathogenic fungal strain used was *Aspergillus parasiticum* NRRL 2999 obtained from the National Research Center at El-Doki, Giza, Egypt. The fungus strain was maintained at 5°C until used. The antifungal activity of the chloroform and ethyl acetate extracts of *L. sempervirens* leaves, together with the isolated compounds **1**, **2**, **3**, **4**, and **5** was assessed using methods described by Farag *et al* (1986)[9] and Chkhikvishvili and Gogiya (1995)[10]. Ten-ml portions of Potato Dextrose Agar medium (PDA) were placed in Petri dishes. The spores suspension of the fungus was poured in the center of solid agar surface (control). Different quantities of each extract or tested compounds were mixed thoroughly with 10 ml of melted PDA mediam to give final concentrations of 500, 1000, and 2000 ppm (0.5

mg, 1 mg and 2 mg / 10 ml melted PDA medium) then poured into Petri dishes. All plates were incubated at 28°C for 7 days after which the fungal growth diameter was measured (mm) for each plate and compared with control. The percentage of inhibition was calculated as the difference between the growth diameter of control and that of the tested extract or compound divided by the growth diameter of control and multiplied by 100.

Characterization of the isolated compounds:

Compound 1 (betulin) occurred as a white powder. It gave a deep pink-violet color with vanillin-H_2SO_4 spray reagents and heating for one minute. It gave a positive Liebermann- Burchard's test. M.p. 236-238 °C. R_f: 0.34 [silica gel, CH_2Cl_2- MeOH, 9:1] UV λ_{max} ($CHCl_3$):241 nm. ^{1}H-NMR spectral data (400 MHz, $CDCl_3$) δ 4.68 and 4.58 (2H, 2 br.s, CH_2-29), 3.8 and 3.33 (2H, 2 d, J=11 Hz, CH_2OH-28), 3.19 (m, H-3), 2.38 (m, H-19), 1.68 (3H, s, CH_3-30) and five singlet each equal to 3 H at δ 1.02, 0.98, 0.97, 0.82 and 0.76 ppm assigned for CH_3- 24, 25, 23, 27 and 26, respectively. ^{13}C-NMR data (67.5 MHz, $CDCl_3$) at δ 38.75 (C-1), 27.45 (C-2), 78.98 (C-3), 38.91 (C-4), 55.30 (C-5), 18.39 (C-6), 34.29 (C-7), 40.96 (C-8), 50.42 (C-9), 37.21 (C-10), 20.91 (C-11), 25.28 (C-12), 37.36 (C-13), 42.75 (C-14), 27.12 (C-15), 29.24 (C-16), 47.82 (C-17), 48.79 (C-18), 47.82 (C-19), 150.32 (C-20), 29.82 (C-21), 34.04 (C-22), 28.05 (C-23), 15.46 (C-24), 16.08 (C-25), 16.21 (C-26), 14.86 (C-27), 60.56 (C-28), 109.61 (C-29), 19.17 (C-30).

Compound 2 (lonisemperin) occurred as a yellow powder (MeOH). It also gave a yellow color with NaOH and vanillin-H_2SO_4 spray reagents. R_f: 0.51 [silica gel, CH_2Cl_2-MeOH, 9.5:0.5]. UV λ_{max} (MeOH): 327 and 271 nm; +NaOMe: 368, 295 (sh) and 278 nm; +$AlCl_3$: 339, 293 and 281 nm, +$AlCl_3$/HCl:339, 293 and 281 nm; +NaOAc; 363, 277 and 224 nm; +NaOAc/H_3BO_3: 327, 306, 271 and 228 nm. Positive FAB-MS gave molecular ion peaks at m/z: 553 $[M+1]^+$, 552 $[M]^+$, 307, 289, 273, 154 (base peak) and 136. ^{1}H-NMR spectral data (500 MHz, DMSO-*d6*) and ^{13}C-NMR spectral data (125 MHz, DMSO-*d6*) Table (1).

Compound 3 (luteolin) occurred also as a yellow powder (MeOH). It gave a yellow color with NaOH and vanillin-H_2SO_4 spray reagents. R_f: 0.38 [silica gel, CH_2Cl_2 – MeOH, 9:1]. UV λ_{max} (MeOH) : 349, 255 nm; +NaOMe: 401, 335, 257 nm; +$AlCl_3$ 425, 330, 300, 272 nm; +$AlCl_3$/HCl: 385, 358 and 295, 272 nm; + NaOAc: 382, 267 nm; +NaOAc/H_3BO_3: 373, 267 nm. ^{1}H-NMR spectral data (500 MHz, DMSO-*d6*): δ 7.38 (dd, J= 2. 2, 8.4 Hz, H-6'), 7.36 (d, J= 2. 2 Hz, H-2'), 6.85 (d, J=8.4 Hz, H-5'), 6.65 (s, H-3), 6.42 (d, J=2.3 Hz, H-8) and 6.15 ppm (d, J= 2.3 Hz, H-6). ^{13}C-NMR data (125 MHz, DMSO-*d6*), Table (2).

Compound 4 (β-sitosterol glucoside) occurred as a white precipitate. It gave a deep violet color with vanillin-H_2SO_4 spray reagents and heating for one minute. It gave positive Liebermann- Burchard's and Molische's tests. its mp 257-258 °C. R_f 0.63 [silica gel, CH_2Cl_2 -MeOH, 9:1]. UV ($CHCl_3$) λ_{max} 242 and 272 sh nm. EI-MS *m/z* 576 $[M]^+$, 414 $[M\text{-}glc]^+$. ^{1}H-NMR (500 MHz, pyridine-d_5): δ 5.38 (1H, m, H-6), 5.08 (1H, d, J = 7.8 Hz, H-1'), 4.58 (1H, dd, J = 1.9 and 11.9 Hz, H-6'α), 4.42 (1H, dd, J = 11.9 and 6.1 Hz, H-6'β), 4.06-4.33 (H-2', 3', 4' and 5'), 4.02 (1H, m, H-3), 0.68 (3H, s, CH_3-18), and 0.90 ppm (3H, d, J= 6.6 Hz, CH_3-21).

Compounds 5, 6, 7 were obtained as yellow precipitate (MeOH). They gave a yellow color with NaOH and vanillin-H_2SO_4 spray reagents and positive Molische's test.

Compound 5 (acacetin-7-*O*-β-D-glucoside): UV λ_{max} (MeOH) : 325, 268 nm, +NaOMe: 356, 287, 242 nm; +$AlCl_3$: 381, 345, 300, 277 nm; +$AlCl_3$/HCl: 381, 338, 299, 278 nm; + NaOAc: 325, 268 nm; +NaOAc/H_3BO_3: 328, 268 nm. R_f: 0.60 [silica gel, EtOAc–MeOH-H_2O, 100:16.5:13.5]. ^{1}H-NMR spectral data (500 MHz, DMSO-*d6*): δ 7.93 (2H, d, J= 8.4 Hz, H-2'/6'), 6.91 (2H, d, J= 8.4 Hz, H-3'/5'), 6.84 (s, H-3), 6.80 (s, H-8), 6.42 (s, H-6), 5.40 (d, J= 4.6 Hz, H-4''), 5.13 (d, J= 4.6 Hz, H-3''), 5.06 (d, J= 5.4 Hz, H-2''), 5.03 (d, J= 7.7 Hz, H-1''), 4.61 (t, J= 6.1 Hz, H-5''), 4.38 and 3.68 (dd, J= 1.9, 10.9 Hz, H-6'') and 3.86 (s, OCH_3). ^{13}C-NMR data (125 MHz, DMSO-*d6*), Table (2).

Compound 6 (luteolin-7-*O*- β-D-glucoside): UV λ_{max} (MeOH) : 348, 255 nm, +NaOMe: 402, 362 nm, +$AlCl_3$: 419, 273 nm; +$AlCl_3$/HCl: 386, 361, 270 nm, + NaOAc: 399, 261 nm; +NaOAc/H_3BO_3: 372, 261 nm. R_f: 0.55 [silica gel, EtOAc–MeOH-H_2O, 100:16.5:13.5]. ^{1}H-NMR (500 MHz, DMSO-*d6*) δ 7.42 (dd, , J= 2. 2, 8.4 Hz H-6'), 7.39 (d, J= 2. 2 Hz, H-2'), 6.87 (d, J= 7.6 Hz, H-5'), 6.76 (s, H-3), 6.72 (s, H-8), 6.41(s, H-6), 5.05 (d, J= 6.9 Hz, H-1'') and 3.69-3.13 (H-2''-H-6''). ^{13}C-NMR data (125 MHz, DMSO-*d6*), Table (2).

Compound 7 (apigenin-7-*O*- β-D-neohesperidoside): UV λ_{max} (MeOH) : 341, 262 nm. +NaOMe: 394, 259 nm; +$AlCl_3$: 388, 349, 297, 274 nm; +$AlCl_3$/HCl: 388, 346, 297, 272 nm, + NaOAc: 394, 266 nm; +NaOAc/H_3BO_3: 344, 266 nm. R_f: 0.53 [silica gel, EtOAc–MeOH-H_2O, 100:16.5:13.5]. ^{1}H-NMR (500 MHz, DMSO-*d6*). δ 7.90 (2H, d, J= 8.4 Hz, H-2'/H-6'), 6.90 (2H, d, J= 8.4 Hz, H-3'/5'), 6.80 (s, H-3), 6.76 (s, H-8), 6.33 (s, H-6), 5.20 (s, H-1'''), 5.19 (d, J= 6.8 Hz, H-1''). ^{13}C-NMR data (125 MHz, DMSO-*d6*), Table (2).

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Table (1): ^{13}C- and ^{1}H-NMR spectral data of compound 2.

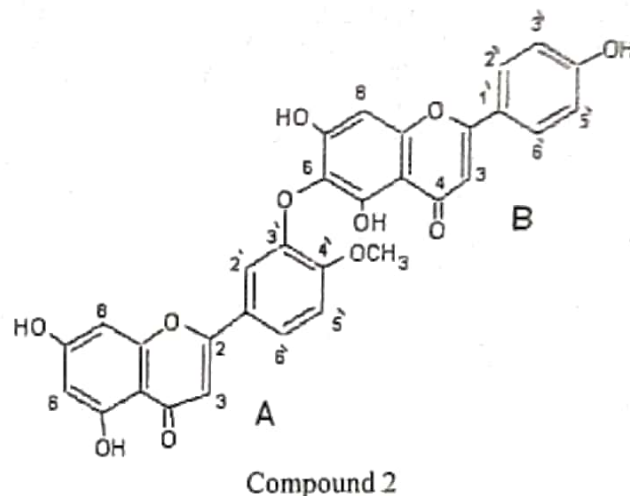
Atom	^{13}C-NMR	^{1}H-NMR (J)	Atom	^{13}C-NMR	^{1}H-NMR (J)
Moiety A:			Moiety B:		
2	163.92	---	2	163.92	---
3	103.54	6.95, s	3	103.54	6.86, s
4	181.34	---	4	181.34	---
5	161.04	---	5	161.08	---
6	98.68	6.20, br. s	6	103.82	---
7	161.70	---	7	162.53	---
8	93.80	6.50, br. s	8	93.91	6.48, s
9	156.98	---	9	156.88	---
10	103.98	---	10	103.98	---
1'	123.09	---	1'	124.24	---
2'	120.44	7.94, br. s	2'	128.16	8.03, d (8.91 Hz)
3'	142.07	---	3'	115.53	7.02, d (8.37 Hz)
4'	154.13	---	4'	160.33	---
5'	113.90	7.39, d (8.91 Hz)	5'	115.53	7.02, d (8.37 Hz)
6'	125.13	8.03, unres. dd	6'	128.16	8.03, d (8.91 Hz)
OCH_3	56.44	3.84, s			

Table (2): ^{13}C-NMR spectral data of compounds 3, 5, 6, 7 and 8.

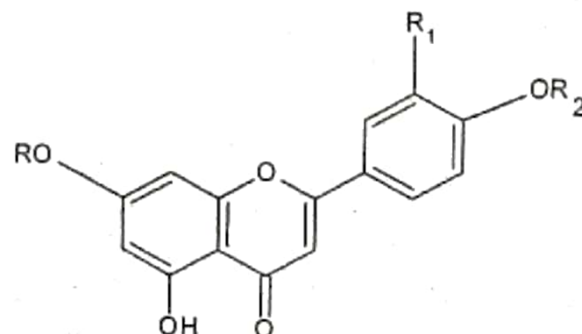
Carbons	Compound 3	Compound 5	Compound 6	Compound 7
2	164.62	163.47	163.46	164.87
3	103.46	105.85	103.68	103.59
4	182.34	182.55	182.43	182.51
5	161.43	161.89	161.66	161.61
6	99.49	100.02	100.05	98.26
7	164.46	164.76	164.99	163.01
8	94.96	95.37	95.24	95.01
9	157.23	157.47	157.47	157.51
10	104.85	103.63	105.86	105.93
1'	121.80	121.55	121.88	121.30
2'	113.89	129.16	114.07	129.14
3'	145.78	116.53	146.31	116.63
4'	149.93	161.89	150.48	162.93
5'	116.45	119.53	116.50	116.63
6'	119.36	129.16	119.72	129.14
1''	---	100.40	100.38	100.99
2''	---	73.62	73.63	77.69
3''	---	77.69	77.67	77.50
4''	---	70.00	70.04	70.13
5''	---	76.94	76.90	76.79
6''	---	61.10	61.12	60.97
OCH_3		56.49		
1'''				100.99
2'''				70.96
3'''				70.90
4'''				72.35
5'''				68.88
6'''				18.61

Table (3): Antifungal activity of the extracts and some isolated compounds.

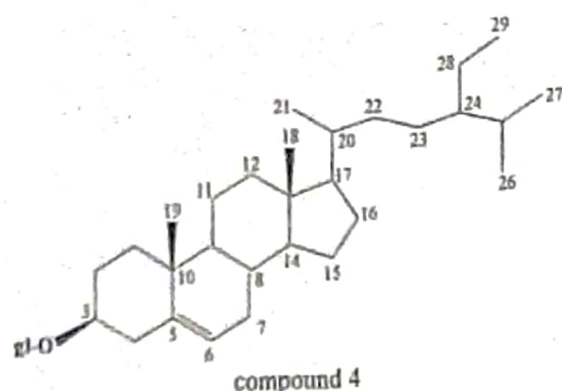
Extracts / compounds	Control (mm)	Growth of *A. Parasiticus* (mm) according to concentration					
		500 ppm	% inhibition	1000 ppm	% inhibition	2000 ppm	% inhibition
Chloroform extract	50	16	68%	7	86%	6	88%
Ethyl acetate extract	50	19	62%	9	82%	7	86%
Compound 1	50	32	36%	28	44%	24	52%
Compound 2	50	30	40%	28	44%	23	54%
Compound 3	50	30	40%	27	46%	23	54%
Compound 4	50	26	48%	24	52%	20	60%
Compound 5	50	36	28%	31	38%	26	48%



Compound 2



Compound	R	R_1	R_2
3	H	OH	H
5	glc	H	CH_3
6	glc	OH	H
7	Rham(1-2)glc	H	H



compound 4

DISCUSSION

Compounds 1 gave positive Liebermann-Burchard's test indicating its steroidal or triterpenoidal nature. It was identified as betulin. ^{13}C-NMR spectrum revealed the presence of 30 carbon atoms. EI-MS gave a molecular ion peak at m/z 442 calculated for $C_{30}H_{50}O_2$. ^{1}H- NMR spectrum showed two broad singlets at δ 4.68 and 4.58 ppm assigned to the two protons of exocyclic methylene group (H-29) which were confirmed in ^{13}C-NMR spectrum by two signals in the downfield region at δ 150.32 and 109.61 assigned for C-20 and C-29, respectively. The two doublets at δ 3.80 and 3.33 ppm (*J*= 11 Hz) were assigned for the two protons of C-28 and resonated at δ 60.56 ppm in ^{13}C-NMR. The multiplet at δ 3.19 assigned for H-3 and resonated at δ 78.98 in ^{13}C-NMR was downfield shifted due to the presence of OH group at this position. Comparing these spectral data with the published literature [11] confirm the structure of compound 1 as Betulin.

Compound **2** gave a yellow colour with $AlCl_3$ and NaOH test solutions indicating its flavonoidal nature. ^{13}C-NMR spectrum revealed the presence of 31 carbon atoms. Positive FAB-MS displayed a molecular ion peak at m/z 552 [M]$^+$ consistant with the molecular formula $C_{31}H_{20}O_{10}$. Both ^{1}H- and ^{13}C-NMR spectra indicated the presence of a biflavonoide compound consisting of two flavone nuclei as indicated from the UV spectrum in MeOH at λ_{max} 327 nm and was confirmed from the signal at δ 181.34 ppm assigned for C-4 for both parts. Part A showed a *meta*- coupling between H-2' (δ 7.94, s)and H-6' (δ 8.03, unres.dd) and *ortho*-coupling between H-6' and H-5' (δ 7.39, d, *J*= 8.91 Hz) while part B showed two doublets at δ 8.03 and 7.02 ppm, respectively, assigned for H-2' / H-6' and H-3' / H-5', respectively. The bathochromic shift with NaOMe (41nm) indicated the presence of a free OH group at C-4 on part b which was confirmed from the bathochromic shift in band I (36 nm). The absence of any shift after the addition of $Alcl_3$ relative to $Alcl_3$ /HCl indicated the absence of free *ortho*-dihydroxy group in any part of the compound which was confirmed by the absence of any shift in band I by the addition of $NaOAc/H_3BO_3$. The bathochromic shift in band II (16 nm) by the addition of NaOAc indicated the presence of free OH group at C-7. ^{1}H-NMR spectrum showed a singlet at δ 6.50 assigned for H-8 in part B and no signal for H-6 indicated that this position is occupied. Comparing the data of part B by the published ones about scutellarein and comparing the data of part A by the published ones for acacetin [12-13], it was found that the signal assigned for C-3' in part A in ^{13}C-NMR spectraum was shifted to the dowenfield region at δ 142.07 ppm (c.f. acacetin at 114.8 ppm) and the signal assigned for C-6 in part B was shifted to the upfield region at δ 103.82 ppm (c.f. scutellarein at 130.4 ppm) indicated that the linkage occured at these two positions. The interperetation of these data as well as COSY, HMBC and HMQC-NMR spectra confirm the structure of compound **2** to be scutellarein-(6-O-3')-acacetin. It is considered as a new compound and have never been isolated from any natural source and hence, it was named as Lonisemperin.

Compound **4** was identified as β-sitosterol glucoside. EI-MS gave a molecular ion peak at m/z 576 [M]$^+$. Acid hydrolysis and TLC alongside authentic sugars revealed the presence of D-glucose which indicated in the ^{1}H-NMR spectrum by the anomeric proton signal at δ 5.08 (d, *J*= 7.8 Hz) as indicated in the EI-MS by the cleavage of 162 amu to give a molecular ion peak at m/z 414 [M-glc]$^+$. The coupling constant of the anomeric proton indicating β-configuration of the glucose moiety. TLC comparison with authentic samples as well as comparison of these spectral data with the published ones[14-15] confirmed the identity of compound **4** as β-sitosterol glucoside.

Compounds **3**, **5**, **6** and **7** gave a yellow colour with $AlCl_3$ and NaOH test solutions indicating their flavonoidal nature. Their UV spectrum in MeOH indicating the presence of a flavone nucleus in these compounds which was confirmed from the ^{13}C-NMR spectral data, Table (1) from the signals at ca δ 182 assigned to C-4. Compounds **5**, **6** and **7** gave a positive Molische's test indicated their glycosidic nature.

Compound **3** was identified as luteolin. A significant bathochromic shift in band I with increasing intensity with NaOMe (52 nm) indicating the presence of free OH group at C-4' which was confirmed from the bathochromic shift in band I (33 nm) after the addition of NaOAc while the bathochromic shift in band II (12 nm) after the addition of NaOAc indicated the presence of a free OH group at C-7. The characteristic bathochromic shift (76 nm) in band I with $AlCl_3$ indicated the presence of a free OH group at C-5 and the shift decrease to (36 nm) on adding HCl indicated the presence of a free *ortho*-dihydroxy group in ring B. The bathochromic shift in band I (24 nm) with $NaOAc/H_3BO_3$ confirmed the presence of *ortho*-dihydroxy group in ring B. ^{13}C-NMR spectrum showed two signals at δ 94.96 and 99.49 ppm assigned to C-8 and C-6, respectively, indicated that these positions are unsubstituted which was confirmed from ^{1}H-NMR spectrum where the doublet at δ 6.15

(1H, d, J = 2.3 Hz, H-6) showed a meta-coupling with the doublet at δ 6.42 (1H, d, J= 2.3 Hz, H-8). Comparing these data with the puplished ones[12-13], confirm the structure of compound **3** to be luteolin.

Compound **6** showed spectral data similar to that of compound **3** except the presence of an anomeric proton signal at δ 5.05 (d, J= 6.9 Hz) assigned to H-1" of sugar moiety and indicated by the anomeric carbon signal at δ 100.38 ppm. The other values of the carbons indicated that the sugar moiety was glucose and the high J value indicated the β-configuration of the sugar which was attached to position 7 of the aglycone moiety. This was confirmed by the absence of a real shift in band II after the addition of NaOAc indicated the absence of free OH group at this position which was occupied by the glucose moiety. Comparing these data with the published ones[12-13], confirm the identity of compound **6** to be luteolin-7-*O*-β-D-glucoside.

The spectral data of compounds **5** and **7** were similar to that of apigenin-7-*O*-β-D-glucoside[12-13] except in compound **5**, there was an extra OCH_3 group which appeared in the ^{1}H-NMR spectrum δ 3.86 and in the ^{13}C-NMR spectrum at δ 56.49 ppm. The bathochromic shift in band I by the addition of $NaOCH_3$ with decrease in intensity indicated the absence of a free OH group at C-4' which was confirmed by the absence of any shift in band I after the addition of NaOAc indicated the presence of the OCH_3 group at this position. The analysis of these data and by comparing it with published ones[13] confirmed the structure of compound **5** to be acacetin-7-*O*-β-D-glucoside. But in case of compound **7**, there was an additional sugar moiety more than that of apigenin-7-*O*-β-D-glucoside as indicated by the anomeric proton signal at δ 5.20 and the anomeric carbon signal at δ 100.99 ppm. The other assignment of carbons atoms indicated that the sugar moiety is rhamnose. The dowenfield shift of C-2" of glucosyl moiety indicated that the rhamnosyl moiety linked at these position[16]. By comparing the spectral data with the published ones[14], compound was confirmed to be apigenin-7-*O*-β-D-neohesperidoside.

Antifungal activity:

The chloroform and ethyl acetate extracts of *L. sempervirens* leaves, together with the isolated compounds **1**, **2**, **3**, **4**, and **5** showed variable degrees of dose dependant antifungal activity. At different concentrations (500, 1000, and 2000 ppm), the chloroform extract has the most potent anti-fungal activity compared to ethyl acetate extract. Similarly, among the tested compounds, compound **4** has the most potent anti-fungal activity at different concentrations compared to other tested compounds.

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مركب بايفلافونويدى جديد من لونيسيرا سمبرفيرنس

منى جوده زغلول

قسم العقاقير - كلية الصيدلية - جامعة المنصورة – المنصورة - مصر

ادت الدراسة الكيميائية لخلاصة خلات الاثير لنبات لونيسيرا سمبرفيرنس الىفصل سبعه مركبات وهى بتيولين ومركب فلافونيدى جديد وهو لونيسمبرين ولتيولين وبيتاسيتوستيرول جليكوزيد من خلاصة الكلوروفورم. وكذلك أكاسيتين-٧-أ- جليكوزيد و لتيولين-٧-أ- جليكوزيد وأبيجينين-٧-أ- نيوهيسبريدوزيد من خلاصة خلات الاثير. وقد تم التعرف عليهم بواسطة خواصهم الطبيعية والطيفية، وتم دراسه النشاط المضاد للفطريات لهذه الخلاصات وكذلك لبعض المواد المفصوله باستخدام فطر أسباراجالاس باراستيكم الذى يفرز الأفلاتوكسين. وقد أظهرت خلاصة الكلوروفورم وكذلك بيتاسيتوستيرول جليكوزيد أقوى تأثير مضاد للفطريات.