IJP (2017), Vol. 4, Issue 6 **(Research Article)**

Received on 08 March 2017; received in revised form, 21 May 2017; accepted, 30 May 2017; published 01 June 2017

CHEMICAL CONSTITUENTS FROM THE AERIAL PARTS OF *LANTANA INDICA* ROXB.

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Keywords:

Lantana indica Roxb, Leaves, Chemical constituents, Isolation, Structure elucidation

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ABSTRACT: *Lantana indica* Roxb. (Verbenaceae) is grown as an ornamental plant in tropical and subtropical regions of the world. The plant is used to treat asthma, abdominal disorders, bilious fever, cancer, catarrhal infections, chicken pox, eczema, hypertension, malaria, measles, swelling, rheumatism, tetanus, and ulcers. Phytochemical investigation of a methanolic extract of the leaves led to isolating three new chemical constituents characterized n-heneitriacont-4-en-16β, 17β, 18β-triol (n-heneitriacontenol, 3), 6, 4'- dimethoxy- 7, 3'- dihydroxy flavone- 7- O- β-D-glucopyranoside (lantanaflavone 7-O-β-D-glucoside, 6), urs-12-en-3β-ol-28-oic acid 3β-D-glucopyranosyl-6´-octadecanoate (ursolic acid 3-O-β-D-glucosyl-6'-oleate, 8) along with five known compounds characterized as n- hexadecanyl oleate (1), n-octadecanyl oleate (2), oleanolic acid (4), ursolic acid (5) and oleanolic acid 3-O-β-D-glucopyranoside (7). The structures of all the isolated phytoconstituents have been established on the basis of spectral data analysis and chemical reactions.

INTRODUCTION: *Lantana indica* Roxb., syn. *L. Collina* Decne, L. *latifolia* Tausch (Verbenaceae), known as west Indian lantana, tickberry, wild sage, is a low, erect, bushy, evergreen, wild shrub native to tropical and subtropical regions of the world with bunches of light purple flowers and opposite and whorled pubescent leaves [1]. It is one of the world's worst weed and a popular ornamental plant [2]. It rapidly disturbed the ecological equilibrium due to its inexhaustible growth [3, 4].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.IJP.4(6).193-99

The article can be accessed online on www.ijpjournal.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.4(6).193-99

The plant is used in folklore and traditional systems of medicine as a sudorific, intestinal antiseptic, diaphoretic and to treat asthma, abdominal disorders, bilious fever, cancer, catarrhal infections, chicken pox, eczema, hypertension, malaria, measles, swelling, rheumatism, tetanus and ulcers [5-8]. It exhibited antimicrobial, insecticidal, nematicidal, immunosuppressive, antitumor [9], antimalarial [7, 10], antithrombin [11], anti-inflammatory, antinociceptive and antipyretic activities [12, 13]. Previous phytochemical investigations of the plant showed the presence of steroids, flavonoids, camaryolic acid, methyl camera late and camangeloyl acid, steroid [14], fatty acids, triterpenoids [15-18], verbascoside [9], gautin, rutinoside, tricin, hispidulin, pectolinarigenin, icterogenin [19] and essential oils [20, 21].

This manuscript describes isolation and characterization of phytoconstituents from the leaves of *L. indica* grown in Delhi.

MATERIALS AND METHODS:

Materials: Melting points were determined on a thermoelectrically heated perfit apparatus without correction. The IR spectra were measured in KBr pellet on a Bio-Red FT-IR spectrometer. UV spectra were obtained in methanol with a Lambda Bio 20 spectrometer. The ^{1}H (300 MHz) and ^{13}C (75 MHz) NMR spectra were recorded on Bruker DRS 300 MHz spectrometer with TMS as an internal standard. Mass spectra were performed on a Jeol D-300 (EI/CI) system. Column chromatographic separations were carried out on silica gel (Merck, 60-120 mesh). Precoated silica gel plates (Merck, Silica gel 60 F_{254}) were used for analytical thin layer chromatography, and the spots were visualized by exposure UV radiations and iodine vapors and spraying with ceric sulphate.

Plant Material: The fresh leaves of *L. indica* were collected from a field in New Delhi and identified by Prof. M.P. Sharma, Department of Botany, Jamia Hamdard. A specimen voucher of the leaves was deposited in the herbarium of the Phytochemistry Research Laboratory, Faculty of Pharmacy, Jamia Hamdard for future reference.

Preparation of Extract and Isolation: The dried pulverized leaves (1.5kg) were extracted with methanol in a Soxhlet extractor. The combined extracts were dried under reduced pressure to obtain a dark brown residue (145g). The residue (100g) was dissolved in minimum amount of methanol and adsorbed on silica gel for column grade (60-120 mesh) to prepare the slurry. It was air-dried, powdered and loaded on a silica gel column prepared in petroleum ether.

The column was run with petroleum ether (B.P. 60-80 °C), petroleum ether-chloroform (9:1, 3:1, 1:1, 1:3, v/v), chloroform and chloroform-methanol (99:1, 49:1, 19:5, 9:1, 17:3, 4:1, 7:3 and 1:1, v/v) mixtures. Various fractions were collected separately and matched by TLC to check homogeneity. Similar fractions having the same R_f values were combined and crystallized. The isolated compounds were recrystallized to get pure compounds as follows-

***n*-Hexadecanyl Oleate (1):** Elution of the column with petroleum ether gave colourless crystals of 1, recrystallized from acetone - methanol, 1:1), 205 mg, m. p. 76-78 ºC, UV λ_{max} (MeOH): 205 nm (log ε 4.5); IR ν_{max} (KBr): 2928, 2859, 1731, 1645, 1458, 1372, 1215, 1078, 970, 765 cm^{-1}, ^{1}H NMR ($CDCl_3$): δ 5.33 (1H, m, H-9), 5.01 (1H, m, H-10), 4.21 (2H, t, J = 6.1 Hz, H_2-1′), 2.79 (2H, t, J = 7.1 Hz, H_2-2), 2.32 (2H, m, H_2-8), 2.05 (2H, m, H_2-11), 1.61 (2H, m, CH_2), 1.52 (2H, m, CH_2), 1.38 (4H, m, 2 x CH_2), 1.32 (4H, m, 2 x CH_2), 1.28 (10H, brs, 5 x CH_2), 1.25 (28H, brs, 14 x CH_2), 0.92 (3H, t, J = 6.7 Hz, Me-16), 0.87 (3H, t, J = 6.3 Hz, Me-18); ESI MS *m/z* (rel. int.): 506 $[M]^+$ ($C_{34}H_{66}O_2$) (4.7).

***n*-Octadecanyl Oleate (2):** Elution of the column with petroleum ether - chloroform (3:1) yielded colourless crystals of 2, recrystallised from acetone - methanol, 1:1), 105 mg, m. p. 83 - 85 ºC; UV λ_{max} (MeOH): 205 nm (log ε 3.8); IR ν_{max} (KBr): 2927, 2859, 1720, 1635, 1441, 1375, 1219, 769 cm^{-1}; ^{1}H NMR ($CDCl_3$): δ 5.35 (2H, m, H-9, H-10), 4.21 (2H, t, J = 6.6 Hz, H_2-1′), 2.80 (2H, t, J = 7.2 Hz, H_2-2), 2.32 (2H, m, H_2-8), 2.05 (2H, m, H_2-11), 1.60 (2H, m, CH_2), 1.56 (2H, m, CH_2), 1.31 (16H, brs, 8 x CH_2), 1.25 (340H, brs, 17 x CH_2), 0.88 (3H, t, J = 6.6 Hz, Me-18′), 0.85 (3H, t, J = 6.5 Hz, Me-18); ESI MS *m/z* (rel. int.): 534 $[M]^+$ ($C_{36}H_{70}O_2$) (3.1).

***n*-Heneitriacontenol (3):** Elution of the column with chloroform produced a colourless amorphous powder of 3, recrystallized from acetone- methanol (1:1), 95 mg, m. p. 87 - 89 ºC, IR ν_{max} (KBr): 3464, 3445, 2927, 2852, 1635, 1452, 1384, 990, 829, 726 cm^{-1}; ^{1}H NMR ($CDCl_3$): δ 5.33 (2H, m, H-4, H-5), 3.89 (1H, m, $w_{1/2}$ = 9.2 Hz, H-16α), 3.71 (1H, m, $w_{1/2}$ = 8.5 Hz, H-17α), 3.67 (1H, m, $w_{1/2}$ = 9.3 Hz, H-18α), 2.03 (2H, m, H_2-3), 1.90 (2H, m, H_2-6), 1.62 (2H, m, CH_2), 1.55 (2H, m, CH_2), 1.32 (4H, m, 2 x CH_2), 1.28 (36H, brs, 18 x CH_2), 0.89 (3H, t, J = 6.5 Hz, Me-1), 0.85 (3H, t, J = 6.3 Hz, Me-31); ESI MS (rel. int.): 482 $[M]^+$ ($C_{31}H_{62}O_3$) (38.1), 439 (5.2), 413 (37.9), 299 (8.1), 273 (9.8), 239 (10.2), 213 (9.5), 209 (6.2), 183 (7.8).

Oleanolic acid (4): Elution of the column with chloroform-methanol (49 : 1) afforded colourless crystals of 4, recrystallized from chloroform-methanol (1 : 1), 0.71 g, m. p. 307-309 ºC; UV λ_{max} (MeOH): 209 nm (log ε 4.8); IR ν_{max} (KBr): 3412,

2927, 2849, 1697, 1641, 1459, 1377, 1273, 1172, 1036, 995 cm^{-1}; ^1H NMR ($CDCl_3$): δ 5.21 (1H, m, H-12), 3.18 (1H, dd, J = 5.6, 9.5 Hz, H-3β), 1.25 (3H, s, Me-23), 1.03 (3H, s, Me-25), 0.93 (3H, s, Me-24), 0.85 (3H, s, Me-30), 0.81 (3H, s, Me-29), 0.76 (3H, s, Me-27), 0.67 (3H, s, Me-26), 2.01-1.17 (23 H, 10 x CH_2, 3 x CH); ^{13}C NMR (DMSO-d_6): δ 38.55 (C-1), 28236 (C-2), 78.43 (C-3), 41.02 (C-4), 55.39 (C-5), 18.72 (C-6), 33.31 (C-7), 39.37 (C-8), 53.49 (C-9), 36.75 (C-10), 23.38 (C-11), 128.05 (C-12), 138.14 (C-13), 42.68 (C-14), 26. 75 (C-15), 28.56 (C-16), 41.55 (C-17), 50.49 (C-18), 45.71 (C-19), 31.28 (C-20), 34.61 (C-21), 31.16 (C-22), 28.79 (C-23), 15.17 (C-24), 15.68 (C-25), 27.32 (C-26), 21.84 (C-27), 178.36 (C-28), 24.72 (C-29), 26.19 (C-30); ESI-MS (rel.int.): 456 $[M]^+$ ($C_{30}H_{48}O_3$) (25.1), 438 (64.7), 411 (45.9), 393 (22.3), 248 (54.8), 207 (16.8), 205 (22.1), 203 (51.6), 189 (48.3), 174 (16.8).

Ursolic acid (5): Further elution of the column with chloroform-methanol (49:1) furnished colourless crystals of 5, recrystallized from chloroform - methanol (1 : 1), 0.55 g, m. p. 285-287 ºC; UV λ_{max} (MeOH): 210 nm (log ε 4.8); IR ν_{max} (KBr): 3427, 3231, 2934, 2845, 1695, 1645, 1451, 1375, 1224, 1189, 1091, 1033, 949, 815 cm^{-1}; ^1H NMR ($CDCl_3$): δ 5.25 (1H, d, J = 7.1 Hz, H-12), 3.54 (1H, dd, J = 5.5, 9.3 Hz, H-3β), 1.25 (3H, s, Me-23), 1.13 (3H, s, Me-25), 0.98 (3H, s, Me-24), 0.89 (3H, d, J = 6.6 Hz, Me-30), 0.85 (3H, d, J = 6.6 Hz, Me-29), 0.79 (3H, s, Me-27), 0.67 (3H, s, Me-26), 2.03- 1.19 (23 H, 9 x CH2, 5 x CH); ^{13}C NMR ($CDCl_3$): δ 39.15 (C-1), 28.62 (C-2), 78.84 (C-3), 39.53 (C-4), 55.65 (C-5), 18.76 (C-6), 33.54 (C-7), 39.71 (C-8), 47.72 (C-9), 37.25 (C-10), 23.91 (C-11), 125.53 (C12), 139.71 (C-13), 42.42 (C-14), 28.39 (C-15), 24.63 (C-16), 47.49 (C-17), 53.12 (C-18), 42.09 (C-19), 40.11 (C-20), 32.26 (C-21), 35.27 (C-22), 29.15 (C-23), 15.73 (C-24), 15.89 (C-25), 16.89 (C-26), 23.67 (C-27), 179.12 (C-28), 18.16 (C-29), 22.53 (C-30); ESI-MS (rel.int.): 456 $[M]^+$ ($C_{30}H_{48}O_3$) (23.9), 438 (61.5), 411 (34.6), 393 (28.2), 248 (65.3), 207 (21.5), 203 (51.3), 189 (48.5), 174 (18.6).

Lantanaflavone 7-O-β-D-glucoside (6): Elution of the column with chloroform-methanol (19:1) afforded pale yellow crystals of 6, recrystallized from methanol, 155 mg, m. p. 103-105 ºC; UV λ_{max} (MeOH): 274, 331 nm; IR ν_{max} (KBr): 3396, 3210, 2922, 2852, 1695, 1647, 1521, 1465, 1432, 1357, 1302, 1259, 1190, 1110, 1074, 1038, 915, 885 cm^{-1}; ^1H NMR (DMSO-d_6): δ 8.07 (1H, d, J = 9.0 Hz, H-5′), 8.04 (1H, d, J = 9.0 Hz, H-6′), 7.15 (1H, s, H-5), 7.12 (1H, s, H-8), 7.04 (1H, s, H-2′), 6.96 (1H, s, H-3), 5.12 (1H, d, J = 7.2 Hz, H-1″), 3.77 (1H, m, H-5″), 3.69 (1H, m, H-2″), 3.66 (1H, m, H-4″), 3.50 (1H, m, H-3″), 3.13 (2H, d, J = 6.8 Hz, H_2-6″), 3.74 (3H, brs, MeO - 6), 3.71 (3H, brs, MeO-4′); ESI MS *m/z* (rel.int.): 476 $[M]^+$ ($C_{23}H_{24}O_{11}$) (100), 328 (6.2), 300 (6.3), 176 (7.2), 179 (6.1), 163 (13.7), 137 (46.2), 123 (12.2), 120 (12.5).

Oleanolic acid 3-O-β-D-glucoside (7): Elution of the column with chloroform - methanol (9 : 1) afforded colourless crystals of 7, recrystallized from methanol, 265 mg, m .p. 216-217 ºC; UV λ_{max} (MeOH): 213 nm (log ε 4.9); IR ν_{max} (KBr): 3423, 3377, 3206, 2926, 2867, 1701, 1642, 1458, 1367, 1258, 1189, 1031, 875 cm^{-1}; ^1H NMR (DMSO-d_6): δ 5.33 (1H, m, H-12), 5.09 (1H, d, J = 7.3 Hz, H-1′), 4.67 (1H, m, H-5′), 4.53 (1H, m, H-2′), 4.21 (1H, m, H-3′), 3.76 (1H, m, H-4′), 3.39 (1H, dd, *J* = 5.3, 9.5 Hz, H-3α), 3.04 (2H, d, J = 6.6 Hz, H_2-6), 1.27 (3H, brs, Me-23), 1.05 (3H, brs, Me-25), 0.98 (3H, brs, Me-26), 0.95 (3H, s, Me-29), 0.93 (3H, brs, Me-30), 0.83 (3H, brs, Me-27), 2.27-1.39 (22 H, m, 9 × CH_2, 4 x CH); ^{13}C NMR (DMSO-d_6): δ 39.25 (C-1), 28.21 (C-2), 77.81 (C-3), 39.83 (C-4), 55.39 (C-5), 18.35 (C-6), 32.29 (C-7), 39.94 (C-8), 50.81 (C-9), 37.18 (C-10), 23.32 (C-11), 122.51 (C-12), 139.34 (C-13), 39.78 (C-14), 26.61 (C-15), 28.61 (C-16), 42.85 (C-17), 50.39 (C-18), 45.11 (C-19), 30.08 (C-20), 31.11 (C-21), 29.98 (C-22), 22.75 (C-23), 15.17 (C-24), 16.81 (C-25), 27.39 (C-26), 23.12 (C-27), 179.16 (C-28), 26.77 (C-29), 27.49 (C-30), 102.56 (C-1′), 74.21 (C-2′), 67.51 (C-3′), 64.19 (C-4′), 79.78 (C-5′), 60.54 (C-6′). ESI MS *m/z* (rel.int.): 618 $[M]^+$ ($C_{36}H_{58}O_8$) (21.3), 455 (11.5), 438 (59.1), 411 (46.7), 393 (21.8), 378 (7.9), 248 (53.2), 207 (17.5), 205 (22.7), 203 (51.4), 189 (53.1), 174 (16.7).

Ursolic acid 3-*O*-β-*D*-glucosyl-6'-oleate (8): Further elution of the column with chloroform-methanol (9:1) afforded colourless crystals of 8, recrystallised from methanol, R_f m. p. 271-273 ºC; UV λ_{max} (MeOH): 212 nm (log ε 5.1); IR ν_{max} (KBr): 3424, 3361, 3245, 2926, 2849, 1725, 1707, 1636, 1451, 1382, 1278, 1239, 1181, 1035, 994,

729 cm^{-1}; ^1H NMR ($CDCl_3$): δ 5.35 (1H, m, H-12), 5.32 (1H, m, H-9″), 5.28 (1H, m, H-10″), 5.09 (1H, d, J = 7.5 Hz, H-1′), 4.60 (1H, m, H-5′), 4.28 (1H, dd, J = 7.5, 6.0 Hz, H-2′), 4.15 (1H, m, H-3′), 3.96 (1H, m, H-4′), 3.95 (2H, d, J = 9.5 Hz, H_2-6'), 3.63 (1H, dd, J = 5.5, 9.8 Hz, H-3α), 2.34 (2H, t, J = 7.5 Hz, H_2-2″), 2.16 (2H, m, H_2-8"), 2.09 (2H, m, H_2-11"), 1.65 (2H, m, CH_2), 1.34 (6H, brs, 3 x CH_2), 1.32 - 1.29 (9H, m, 5 x CH, 2 CH_2), 1.25 (18H, brs, 9 x CH_2), 1.22 (16H, brs, 8 x CH_2), 1.09 (3H, brs, Me-23), 1.04 (3H, brs, Me-27), 1.01 (3H, brs, Me-25), 0.98 (3H, brs, Me-24), 0.87 (3H, brs, Me-26), 0.85 (3H, d, J = 6.6 Hz, Me-30), 0.82 (3H, t, J = 6.5 Hz, Me-18″), 0.79 (3H, d, J = 6.6 Hz, Me-29); ESI MS (rel.int.): 882 $[M]^+$ ($C_{54}H_{90}O_9$) (3.8), 455 (21.2), 281 (35.2), 265 (8.3), 248 (11.2), 207 (18.5).

DISCUSSION: Compounds 1 and 2 were the fatty acid esters characterized as *n*- hexadecanyl oleate [22] and *n*-octadecanyl oleate [23], respectively. Compound 3 showed IR absorption bands for alcoholic groups (3464, 3445 cm^{-1}), unsaturation (1635 cm^{-1}) and long aliphatic chain (726 cm^{-1}). Based on mass spectrum, its molecular mass was determined at *m/z* 482 corresponding to a molecular formula of a long chain aliphatic trihydroxy alcohol, $C_{31}H_{62}O_3$. The ion peaks arising at *m/z* 439 [M – C_3H_7, C_3 – C_4 fission]$^+$ and 413 [M-69, C_5 – C_6 fission]$^+$ indicated the presence of the vinylic linkage at the C_4 position. The ion fragments generated at *m/z* 209, 273 [C_{15} – C_{16} fission]$^+$, 239 [C_{16} – C_{17} fission]$^+$, 213 [C_{17} –C_{18} fission]$^+$ and 183, 299 [C_{15} – C_{16} fission]$^+$ suggested the existence of the hydroxyl groups at C_{16}, C_{17} and C_{18} carbons. T

he ^1H NMR spectrum of 3 showed a two - proton multiplet at δ 5.33 assigned to vinylic H-4 and H-5 protons. Three one-proton multiplets at δ 3.89 ($w_{1/2}$ = 9.2 Hz, H-16α), 3.71 ($w_{1/2}$ = 8.5 Hz, H-17α) and 3.67 (1H, m, $w_{1/2}$ = 9.3 Hz, H-18α) were ascribed to α-oriented H-16, H-17 and H-18 carbinol protons, respectively. Four two-proton multiplets at δ 2.03, 1.90, 1.62 and 1.55, a four-proton multiplet at δ 1.32 and a broad singlet at δ 1.28 (28 H) were associated with the methylene protons. Two three-proton triplets at δ 0.89 (J = 6.5 Hz) and 0.85 (J = 6.3 Hz) were accounted to terminal primary C-1 and C-31 methyl protons, respectively. Based on the above discussion, the structure of 3 was characterized as *n*-heneitriacont-4-en-16β, 17β, 18β-triol. This is new aliphatic alcohol. Compounds 4 and 5 were the pentacyclic triterpenoids characterized respectively as oleanolic acid [24, 25] and ursolic acid [24, 26].

Compound 6, named lantanaflavone 7-*O*-β-*D*-glucoside, reacted positively to Shinoda and ferric chloride tests and showed UV absorption maxima at 274 and 331 nm distinctive for flavones [27, 28]. There was no UV shift of band II on the addition of sodium acetate indicating bounded nature of the C-7 hydroxyl group. The absence of a bathochromic shift of band I on the addition of aluminum chloride ruled out the existence of free hydroxyl groups at C-5 and C-4′ position (Markham, 1982). The IR spectrum of 6 displayed characteristic absorption bands for hydroxyl groups (3396, 3210 cm^{-1}), carbonyl function (1695 cm^{-1}) and aromatic ring (1647, 1521, 1038 cm^{-1}). Based on the mass spectrum, its molecular ion peak was established at *m/z* 476 consistent with a molecular formula of a flavone glycoside, $C_{23}H_{24}O_{11}$.

The ion fragments arising at *m/z* 328 [$C_{3,4}$ – $C_{1,2}$ fission]$^+$, 300, 176 [$C_{4,10}$ – $C_{1,9}$ fission]$^+$ and 123 [C_6H_3(OH)(OMe)]$^+$ indicated the presence of one each methoxy and glycoside units in ring A and one each of hydroxyl and methoxy groups in ring B. The ion peaks generated at *m/z* 179 [$C_6H_{11}O_6$]$^+$ and 163 [$C_6H_{11}O_5$]$^+$ suggested the location of a hexose moiety in the molecule. The ^1H NMR spectrum of 6 displayed two one-proton doublets at δ 8.07 (J = 9.0 Hz) and 8.04 (J = 9.0 Hz) assigned to aromatic H-5′ and H-6′ protons, respectively, four one-proton singlets at δ 7.15, 7.12, 7.04 and 6.96 ascribed correspondingly to H-5, H-8, H-2′ and H-3 protons of the flavone, a one-proton doublet at δ 5.12 (J = 7.2 Hz) accounted to anomeric H-1″ proton, other sugar protons from δ 3.77 to 3.13 and two three-proton singlets at δ 3.74 and 3.71 due to methoxy protons.

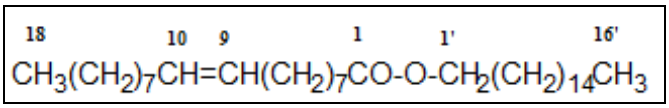
The ^1H NMR values of 6 were compared with the related flavonoids [29, 30]. Acid hydrolysis of 6 yielded D-glucose (R_f 0.12, *n*-butanol-acetic acid-water, 4:1:5) and a flavone unit. Based on the preceding discussion, the structure of 6 has been formulated as 6, 4'-dimethoxy-7, 3'-dihydroxyflavone-7-*O*-β-D-glucopyranoside, a new flavone glucoside.

Compound 7, $[M]^+$ at *m/z* 618 ($C_{36}H_{58}O_8$), showed IR absorption bands for hydroxyl groups (3415, 3385 cm^{-1}), carboxylic function (3266, 1703 cm^{-1}) and unsaturation (1645 cm^{-1}). Its ^1H NMR spectrum exhibited signals for a vinylic proton (δ 5.33, m, H-12), anomeric proton (δ 5.11, d, J = 7.3 Hz, H-1′), other sugar and H-3 oxymethine protons (δ 4.69 – 3.04) and seven tertiary methyl protons (δ 1.31- 0.83). The compound 7 was characterized as oleanolic acid 3-*O*-β-*D*-glucopyranoside [31, 32].

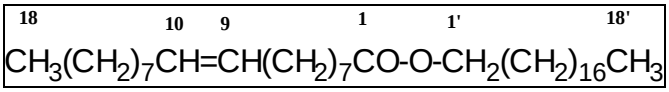
Compound 8 gave positive tests for triterpenic glycosides and showed characteristic IR absorption bands for hydroxyl groups (3424, 3361 cm^{-1}), ester function (1725 cm^{-1}), unsaturation (1636 cm^{-1}) and long aliphatic chain (729 cm^{-1}). Its molecular ion peak was determined based on mass and ^{13}C NMR spectra at *m/z* 882 consistent to a molecular formula of a triterpenic glycosidic ester $C_{54}H_{90}O_9$. The ion peaks arising at *m/z* 265 [$C_{1''}$ – O fission, $CH_3(CH_2)_7$-CH=CH-$(CH_2)_7$ CO]$^+$, 281 [$C_{6'}$ – O fission, $CH_3(CH_2)_7$-CH=CH- $(CH_2)_7$ COO]$^+$ and 455 [O – $C_{1'}$ fission, $C_{30}H_{47}O_3]^+$ indicated that oleic acid was linked to a hexose sugar unit which was attached to a pentacyclic triterpene. The ion peaks produced at *m/z* 207 and 248 due to Retro-Diels Alder fragmentation of the triterpenic unit suggested that a vinylic linkage was present at C_{12} carbon.

The ^1H NMR spectrum of 8 exhibited three one-proton multiplets at δ 5.35, 5.32 and 5.28 assigned to vinylic H-12, H-9" and H-10" protons, respectively, a one – proton doublet at δ 5.09 (J = 7.5 Hz) ascribed to anomeric H-1' proton and other sugar protons as one-proton multiplets at δ 4.60 (H-5′), 4.15 (H-3′), 3.96 (H-4′), as a one – proton double doublet at δ 4.28 (J = 7.5, 6.0 Hz, H-2′) and as a two – proton doublet at δ 3.95 (J = 9.5 Hz) due to oxymethylene H_2-6' protons. A one – proton double doublet at δ 3.63 (J = 5.5, 9.8 Hz) was accounted to oxymethine H-3α proton. Five three – proton singlets at δ 1.09, 1.04, 1.01, 0.98 and 0.87, two three – proton doublets at δ 0.85 (J = 6.6 Hz) and 0.79 (J = 6.6 Hz) and a three-proton triplet at δ 0.82 (J = 6.5 Hz) were associated with the tertiary C-23, C-27, C-25, C-24 and C-26, secondary C-30 and C-29 and tertiary C-18″ methyl protons, all attached to the saturated carbons.

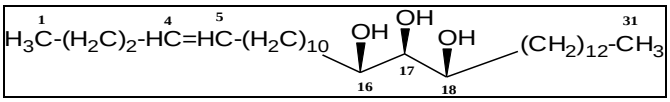
The other methine and methylene protons resonated from δ 2.34 to 1.25. The ^1H NMR spectral data of the triterpenic unit of 8 were compared with spectral values of similar triterpenoids [33]. Acid hydrolysis of 8 yielded ursolic acid (m. p. 285-287 ºC), D-glucose (R_f 0.12, *n*-butanol-acetic acid-water, 4:1:5) and oleic acid. On the basis of spectral data analysis and chemical reactions, the structure of 8 had been formulated as urs-12-en-3β-ol – 28 - oic acid 3β – D - glucopyranosyl -6′-octadecanoate. This is a new triterpenic glycosidic ester.



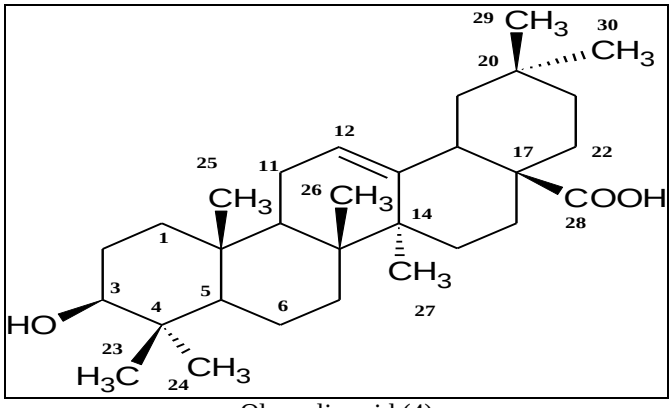
n-Hexadecanyl oleate (1)



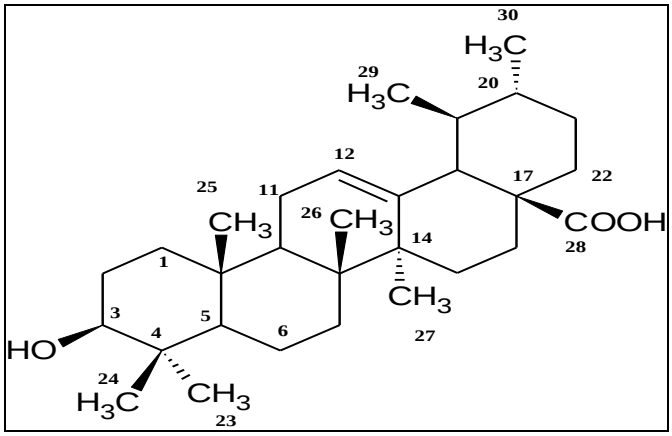
n-Octadecanyl oleate (2)



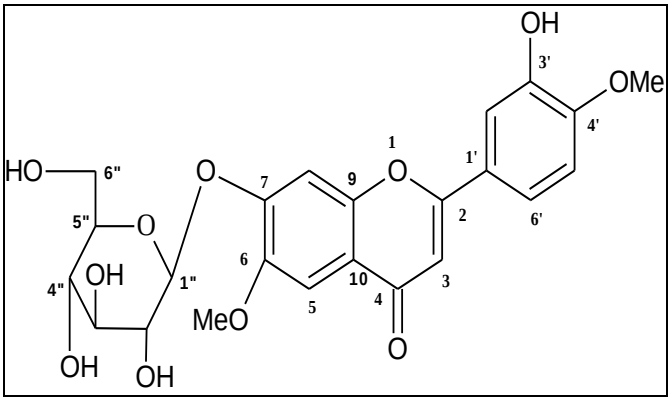
n-Heneitriacont-4-en-16β, 17β, 18β-triol (3)



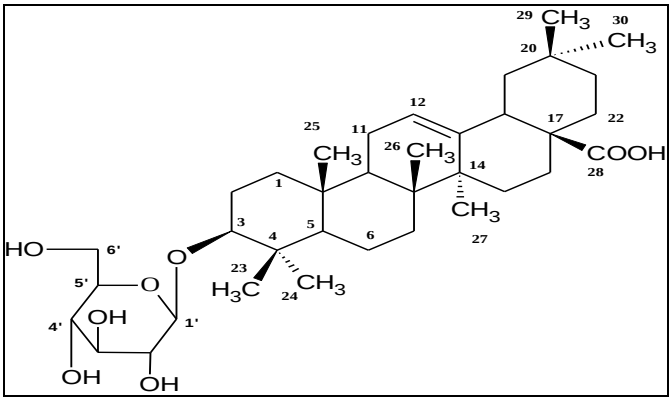
Oleanolic acid (4)



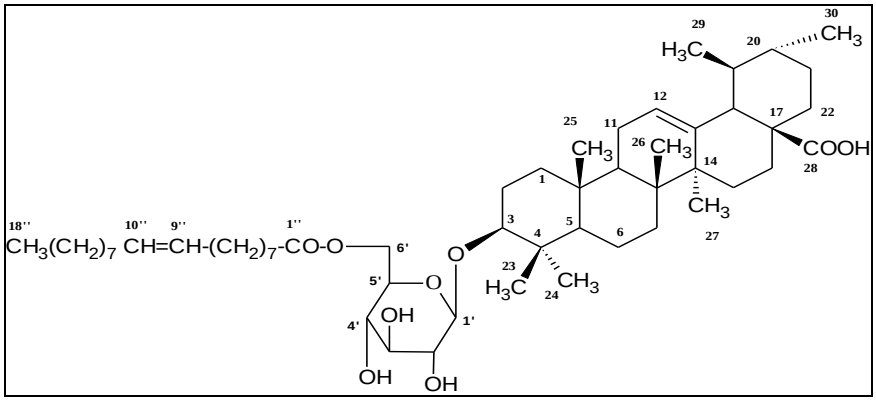
Ursolic acid (5)



Lantanaflavone 7-O-β-D-glucoside (6)



Oleanolic acid glucoside (7)



Ursolic acid 3-*O*-β-D-glucosyl-6'-oleate (8)

CONCLUSION: Phytochemical investigation of a methanolic extract of the leaves of *L. indica* resulted in the isolation of two fatty esters, one each of aliphatic alcohol and flavone glucoside and four pentacyclic triterpenoids. This work has enhanced understanding of the phytoconstituents of the plant. These compounds may be used as chromatographic markers for standardization of the plant leaves.

ACKNOWLEDGEMENT: The authors are thankful to the instrumentation centers, Central Drug Research Institute, Lucknow and Jawaharlal Nehru University, New Delhi for recording spectral data of the compounds.

CONFLICT OF INTEREST: Nil

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How to cite this article:
Ali M, Jameel M, Mir SR and Sultana S: Chemical constituents from the aerial parts of *Lantana indica* roxb. Int J Pharmacognosy 2017; 4(6): 193-99. doi link: http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.4(6).193-99.