

Original Article

NEW LANOSTENE-TYPE TRITERPENES FROM THE OLEO-GUM RESIN OF COMMIPHORA MYRRHA (NEES) ENGL

MOHD. SHUAIB<sup>a,b</sup>, MOHD. ALI<sup>a\*</sup>, KAMRAN J. NAQUVI<sup>a</sup>

<sup>a</sup>Phytochemistry Research Laboratory, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard, New Delhi-110 062, India. <sup>b</sup>Kalka Institute for Research & Advanced Studies, Meerut-250006, Uttar Pradesh.  
Email: maliphyto@gmail.com

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ABSTRACT

**Objective:** To investigate the phytoconstituents from the oleo-gum resin of *Commiphora myrrha* (Nees) Engl.

**Methods:** The structures of isolated phytoconstituent have been elucidated on the basis of spectral analysis and chemical reactions.

**Results:** Phytochemical investigation of the methanolic extract of the oleo-gum resin resulted in the isolation of three new tetracyclic triterpenoids, characterized as lanost-5,9(11), 20(21), (Z)-23,25-pentaene-3 $\beta$ -yl acetate (myrrhalanostenyl acetate, **3**); lanost-5, (Z)-22,25(27)-trien-3 $\beta$ -ol-21,24 $\alpha$ -olide (myrrhalanostenol, **5**) and lanost-5-en-3 $\alpha$ -ol-21, 24 $\alpha$ -olide-26-oic acid (myrrhalanostenic acid, **6**) along with three aliphatic esters identified as *n*-heptadecanyl capriate (**1**), *n*-dodecanyl myristate (**2**) and *n*-hentriacosanyl laurate (**4**).

**Conclusion:** The phytochemical investigation of oleo-resin of *C. myrrha* gave three new lanostene-type triterpenoid along with some known phytoconstituents. These lanostene-type triterpenoid are isolated for the first time from this plant source.

**Keywords:** *Commiphora myrrha*, Burseraceae, Oleo-gum resin, Lanostenoids, Aliphatic esters.

INTRODUCTION

*Commiphora myrrha* (Nees) Engl. (Burseraceae) is a small tree which grows in small sandy and rocky regions of Somalia, Sudan, Ethiopia, Kenya and Saudi Arabia. The schizogenous cavities of the stem and branches of this tree produce a scented oleo-resin which is known as myrrh. It is imported into India since long time and used in perfumery as food additive, fragrance, incense, antiseptic, astringent, stimulant, stomachic, tonic and for embalming. It is an ingredient of toothpastes, mouthwashes and dentifrices. Myrrh tincture is useful in menstrual disorders and chlorosis. In China, it is prescribed to treat wounds, inflammation and menstrual pain due to blood stagnation [1].

Cadinenes, calamenes, triacont-1-ene [2], commiphoric acids, furanosesquiterpenoids [3-10], eudesmol and triterpenoids [11] and volatile oil [12] have been reported from the oleo-resin of *C. myrrha*. This paper describes the isolation of three new tetracyclic lanostene-type triterpenoids along with three known aliphatic esters from the oleo-resin obtained from the Khari Baoli market of Delhi.

MATERIALS AND METHODS

Instrumentation and techniques

Melting points were determined on a Perfit melting apparatus (Haryana, India) and are uncorrected. UV spectra were measured with a Lambda Bio 20 spectrophotometer (Perkin-Elmer-Rotkreuz, Switzerland) in methanol. Infra red spectra were recorded on Bio-Rad FTIR 5000 (FTS 135, Kowloon, Hong Kong) spectrophotometer using KBr pellets;  $\gamma_{\max}$  values are given in  $\text{cm}^{-1}$ .  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were screened on Avance DRX 400, Bruker spectropin 400 and 100 MHz instruments (Karlsruhe, Germany) using TMS as an internal standard.

Mass spectra were scanned by effecting FAB ionization at 70 eV on a JEOL-JMS-DX 303 spectrometer (Japan) equipped with direct inlet probe system. Column chromatography was performed on silica gel (60-120 mesh; Qualigen, Mumbai, India). TLC was run on silica gel G (Qualigen). Spots were visualised by exposing to iodine vapours, UV radiation, and spraying with ceric sulphate.

Plant material

The crude oleo-gum resin of *C. myrrha* was procured from the local market of the Khari Baoli, Delhi. The sample was authenticated by Dr. H.B. Singh, Taxonomist, NISCAIR, CSIR, New Delhi. A voucher specimen of the sample (No. N/R/C/-06-07/803/120) was deposited in the NISCAIR, RHM Division, Dr. K.S. Krishnan Marg (Near Pusa Gate), New Delhi.

Extraction and isolation

The air dried oleo-gum resin (2.5 kg) was coarsely powdered and extracted with methanol at room temperature for one week. The extract was filtered and concentrated under reduced pressure to get 185 g (yielded 7.4 %) of dark brown mass. The concentrated extract of the oleo-resin was dissolved in minimum amount of methanol and adsorbed on silica gel (60-120 mesh) to form slurry. The slurry was air dried and filled up in a silica gel column (1.6 m  $\times$  16 mm  $\times$  2 mm) loaded in petroleum ether and then eluted successively with different solvents in increasing order of polarity in various combinations, such as petroleum ether, petroleum ether-chloroform (9:1, 3:1, 1:1, 1:3), chloroform, chloroform-methanol (19.9:0.1, 99:1, 97:3, 19:1, 93:7, 9:1, 17:3, 3:1, 3:2, 2:3) and methanol. 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. The following compounds were isolated from the methanolic extract of *C. myrrha* oleo-gum resin:

*n*-Heptadecanyl capriate (**1**)

Elution of the column with petroleum ether produced a light coloured sticky mass of **1**, recrystallized from methanol-acetone (9:1), 460 mg (0.0184 % yield);  $R_f$ : 0.73 (petroleum ether-chloroform; 9: 1); m.p.: 76-78°C; +ve ion FAB MS  $m/z$  (rel. int.): 410 [M]<sup>+</sup> (C<sub>27</sub>H<sub>54</sub>O<sub>2</sub>) (33.1), 171 (57.5), 155 (61.3).

*n*-Dodecanyl myristate (**2**)

Further elution of the column with petroleum ether gave a colourless amorphous powder of **2**, recrystallized from acetone-methanol (1:1), 1.41 g (0.0564 % yield);  $R_f$ : 0.77 (chloroform-

methanol; 97: 3); m.p.: 90-92°C; +ve ion FAB MS  $m/z$  (rel. int.): 396 [M]<sup>+</sup>(C<sub>26</sub>H<sub>52</sub>O<sub>2</sub>) (15.6), 227 (33.1), 211 (26.3), 185 (26.7), 169 (73.5).

#### Myrrhalaanostenyl acetate (3)

Elution of the column with petroleum ether-chloroform (9:1) yielded yellow solid mass of **3**, recrystallized from petroleum ether-acetone (1:1), 1.1g (0.044% yield), R<sub>f</sub>: 0.81 (petroleum ether-chloroform (9:1)); m.p.: 70-71°C, UV λ<sub>max</sub> (MeOH): 223, 268 nm (log ε 4.3, 3.7); IR ν<sub>max</sub> (KBr): 2933, 2852, 1741, 1640, 1445, 1378, 1217, 1093, 1037, 758 cm<sup>-1</sup>; <sup>1</sup>H NMR (CDCl<sub>3</sub>): δ 5.73 (1H, m, H-11), 5.49 (1H, m, H-6), 5.57 (1H, d, *J*=5.5 Hz, H-24), 5.21 (1H, ddd, *J*=5.1, 8.5, 5.5 Hz, H-23), 4.94, 4.87 (1H each, brs, H<sub>2</sub>-21), 4.77, 4.70 (1H each, brs, H<sub>2</sub>-26), 4.13 (1H, dd, *J*=5.7, 7.5 Hz, H-3α), 2.02 (3H, brs, OCOCH<sub>3</sub>), 1.66 (3H, brs, Me-26), 1.38 (3H, brs, Me-28), 1.23 (3H, brs, Me-19), 1.19 (3H, brs, Me-30), 1.03 (3H, brs, Me-29), 0.91 (3H, brs, Me-18); <sup>13</sup>C NMR (CDCl<sub>3</sub>): δ 39.47 (C-1), 27.94 (C-2), 84.88 (C-3), 40.74 (C-4), 141.64 (C-5), 125.62 (C-6), 29.49 (C-7), 44.55 (C-8), 149.89 (C-9), 36.35 (C-10), 122.40 (C-11), 22.35 (C-12), 46.14 (C-13), 49.37 (C-14), 34.35 (C-15), 31.72 (C-16), 52.17 (C-17), 19.51 (C-18), 20.93 (C-19), 139.41 (C-20), 111.86 (C-21), 41.59 (C-22), 119.64 (C-23), 129.68 (C-24), 136.43 (C-25), 109.78 (C-26), 24.72 (C-27), 23.34 (C-28), 26.72 (C-29), 14.08 (C-30); +ve ion FAB MS  $m/z$  (rel. Int.): 462 [M]<sup>+</sup>(C<sub>32</sub>H<sub>46</sub>O<sub>2</sub>) (15.2), 419 (6.8), 402 (8.2), 355 (11.3), 312 (14.7), 295 (32.6), 261 (13.6), 247 (29.3), 215 (22.8), 208 (15.3), 194 (22.5), 191 (38.9), 107 (54.2).

#### *n*-Henetriacosanyl laurate (4)

Elution of the column with petroleum ether:chloroform (1:3) afforded a colourless amorphous powder of **4**, recrystallized from methanol-acetone-diethyl ether (7:2:1), 1.76 g (0.0704 % yield); R<sub>f</sub>: 0.46 (chloroform-methanol; 17:3); m.p.: 82-83°C; UV λ<sub>max</sub> (MeOH): 213 nm (log ε 5.3); IR ν<sub>max</sub> (KBr): 3020, 2927, 2857, 2359, 1726, 1605, 1522, 1432, 1215, 1044, 929, 760 cm<sup>-1</sup>; <sup>1</sup>H NMR (CDCl<sub>3</sub>): δ 4.50 (2H, brs, H<sub>2</sub>-1), 1.98 (2H, brs, H<sub>2</sub>-2), 1.66 (2H, m, CH<sub>2</sub>), 1.51 (2H, m, CH<sub>2</sub>), 1.29 (74H, brs, 37×CH<sub>2</sub>), 0.81 (3H, t, *J*=6.1 Hz, Me-31), 0.79 (3H, t, *J*=6.0 Hz, Me-12); +ve ion FAB MS  $m/z$  (rel. int.): 648 [M]<sup>+</sup>(C<sub>44</sub>H<sub>88</sub>O<sub>2</sub>) (37.3), 633 (12.2), 183 (100), 155 (21.7), 126 (25.8).

#### Myrrhalaanostenol (5)

Elution of the column with petroleum ether-chloroform (1:1) furnished light brown mass of **5**, recrystallized from methanol, 143 mg (0.0056 % yield), R<sub>f</sub>: 0.77 (petroleum ether-chloroform, 1:1); m.p.: 64-65°C; UV λ<sub>max</sub> (MeOH): 220, 270 nm (log ε 4.2, 2.1), IR ν<sub>max</sub> (KBr): 3440, 2931, 2852, 1742, 1645, 1443, 1378, 1236, 1145, 1031, 912 cm<sup>-1</sup>; <sup>1</sup>H NMR (CDCl<sub>3</sub>): δ 5.60, (1H, dd, *J*=7.5, 5.6, Hz, H-23), 5.52 (1H, dd, *J*=7.5, 4.9 Hz, H-22), 5.37 (1H, dd, *J*=7.3, 10.7 Hz, H-6), 4.84 (2H, brs, H<sub>2</sub>-26), 4.59 (1H, d, *J*=5.6 Hz, H-24β), 3.25 (1H, dd, *J*=8.7, 4.5 Hz, H-3α), 1.67 (3H, brs, Me-26), 1.16 (3H, brs, Me-19), 1.12 (3H, brs, Me-29), 1.09 (3H, brs, Me-28), 1.01 (3H, brs, Me-30), 0.96 (3H, brs, Me-18); <sup>13</sup>C NMR (CDCl<sub>3</sub>): δ 34.59 (C-1), 28.86 (C-2), 76.56 (C-3), 40.15 (C-4), 142.33 (C-5), 122.76 (C-6), 29.44 (C-7), 41.07 (C-8), 49.01 (C-9), 37.43 (C-10), 21.78 (C-11), 25.08 (C-12), 43.06 (C-13), 47.08 (C-14), 31.83 (C-15), 34.17 (C-16), 49.74 (C-17), 16.11 (C-18), 18.29 (C-19), 41.19 (C-20), 172.78 (C-21), 137.39 (C-22), 137.01 (C-23), 86.02 (C-24), 147.48 (C-25), 107.81 (C-26), 22.93 (C-27), 23.53 (C-28), 26.24 (C-29), 15.04 (C-30); +ve ion FAB MS  $m/z$  (rel. int.): 452 [M]<sup>+</sup>(C<sub>30</sub>H<sub>44</sub>O<sub>3</sub>) (1.3), 313 (16.2), 302 (11.5), 298 (15.8), 280 (63.5), 246 (11.5), 232 (13.9), 220 (50.6), 206 (71.8), 192 (61.8), 188 (21.3), 177 (19.4), 165 (24.6), 164 (19.0), 150 (18.2), 146 (100), 137 (86.2), 132 (69.6), 109 (67.5), 95 (41.1).

#### Myrrhalaanostenonic acid (6)

Elution of the column with chloroform gave colourless solid mass of **6**, recrystallized from methanol-acetone (1:1), 211 mg (0.008 % yield), R<sub>f</sub>: 0.81 (petroleum ether-chloroform; 3:1), m.p.: 66-67°C, UV λ<sub>max</sub> (MeOH): 220 nm (log ε 4.2); IR ν<sub>max</sub> (KBr): 3425, 3218, 2915, 2845, 1740, 1680, 1645, 1460, 1380, 1215, 1035, 746 cm<sup>-1</sup>; <sup>1</sup>H NMR (CDCl<sub>3</sub>): δ 5.03 (1H, m, H-6), 4.82 (1H, brm, *w*<sub>1/2</sub>=9.2 Hz, H-24β), 3.34 (1H, dd, *J*=3.6, 4.5 Hz, H-3β), 1.12 (3H, brs, Me-19), 1.08 (3H, brs, Me-28), 1.03 (3H, brs, Me-29), 0.98 (3H, brs, Me-30), 0.85 (3H, d, *J*=6.5 Hz, Me-27), 0.77 (3H, brs, Me-18), <sup>13</sup>C NMR (CDCl<sub>3</sub>): δ 38.56 (C-1), 28.01 (C-2), 80.27 (C-3), 39.92 (C-4), 141.35 (C-5), 121.48 (C-6),

29.88 (C-7), 38.47 (C-8), 49.76 (C-9), 37.51 (C-10), 22.19 (C-11), 26.43 (C-12), 42.25 (C-13), 46.89 (C-14), 31.58 (C-15), 33.69 (C-16), 51.02 (C-17), 15.41 (C-18), 18.66 (C-19), 41.08 (C-20), 173.08 (C-21), 40.61 (C-22), 24.03 (C-23), 82.65 (C-24), 30.09 (C-25), 181.57 (C-26), 21.75 (C-27), 24.56 (C-28), 28.41 (C-29), 14.89 (C-30), +ve ion FAB MS  $m/z$  (rel. int.): 486 [M]<sup>+</sup>(C<sub>30</sub>H<sub>46</sub>O<sub>5</sub>) (5.1), 334 (10.5), 320 (15.1), 300 (28.2), 297 (15.6), 294 (12.1), 280 (24.7), 266 (12.8), 220 (15.2), 206 (14.2), 192 (16.3), 171 (23.5), 166 (23.5), 152 (20.6).

#### RESULTS AND DISCUSSION

Compounds **1**, **2** and **4** are fatty acid esters characterized as *n*-heptadecanyl caprate, *n*-dodecanyl myristate and *n*-henetriacosanyl laurate, respectively (Figure 1).

Compound **3**, designated as myrrhalaanostenyl acetate, was obtained as a yellow solid mass from petroleum ether-chloroform (9:1) eluants. Its IR spectrum displayed characteristic absorption bands for ester group (1741 cm<sup>-1</sup>) and unsaturation (1640 cm<sup>-1</sup>). On the basis of +ve FAB mass and <sup>13</sup>C NMR spectra, the molecular ion peak of **3** was determined at  $m/z$  462 consistent with the molecular formula of a triterpenic ester C<sub>32</sub>H<sub>46</sub>O<sub>2</sub>. The ion fragments formed at  $m/z$  194 [C<sub>6,7</sub>-C<sub>9,10</sub>, fission]<sup>+</sup>, 208 [C<sub>7,8</sub>-C<sub>9,10</sub>, fission]<sup>+</sup> indicated the location of acetyl group in ring A and the existence of a vinylic linkage at C-5. The ion peaks arising at  $m/z$  215, 247 [C<sub>8,14</sub>-C<sub>11,12</sub>, fission]<sup>+</sup>, and 261 [C<sub>8,14</sub>-C<sub>12,13</sub>, fission]<sup>+</sup> suggested the presence of other vinylic linkage in ring B at C-11. The ion peaks produced at  $m/z$  107 [C<sub>8</sub>H<sub>11</sub>, side chain]<sup>+</sup>, 419 [M-Ac]<sup>+</sup>, 402 [M-AcOH]<sup>+</sup>, 355 [M-side chain]<sup>+</sup>, 314 [355-Ac]<sup>+</sup>, and 295 [355-AcOH]<sup>+</sup> indicated that the C<sub>8</sub> side chain contained three vinylic linkages. The <sup>1</sup>H NMR spectrum of **3** displayed two one-proton multiplets at δ 5.49 and 5.73 assigned to vinylic H-6 and H-11 protons, respectively. Four one-proton broad singlets at δ 4.94, 4.87 and at δ 4.70, 4.77 were ascribed correspondingly to methylene H<sub>2</sub>-21 and H<sub>2</sub>-26 protons. A one-proton triplet doublet at δ 5.21 (*J*=5.1, 8.5, 5.5) and a one-proton doublet at δ 5.57 (*J*=5.5 Hz) were attributed to cis-oriented vinylic H-23 and H-24 protons, respectively. A one-proton double-doublet at δ 4.13 (*J*=7.5, 5.7 Hz) was ascribed to α-oriented oxygenated H-3 methine proton. The remaining methylene protons resonated between δ 2.35-1.45. Two three-proton broad singlets at δ 1.66 and 2.02 were assigned to methyl protons Me-27 attached to olefinic carbon and acetyl protons, respectively. Five three-proton broad singlets at δ 0.91, 1.23, 1.38, 1.03 and 1.19 were associated correspondingly with C-18, C-19, C-28, C-29, and C-30 tertiary methyl protons. The <sup>13</sup>C NMR spectrum of **3** exhibited signals for ester carbon at δ 170.57 (Ac) and vinylic carbons between 149.89-109.78, carbinol carbon at δ 84.88 (C-3) and methyl carbons from δ 26.72-14.08. The <sup>1</sup>H NMR and <sup>13</sup>C NMR spectral data of **3** were compared with the related lanosterol type triterpenoids [13-15]. On the basis of above discussion the structure of **3** was characterized as lanost-5,9(11), 20(21), (Z)-23,25-pentaene-3β-olyl acetate (Figure 1). It is new lanostene-type triterpene isolated from a natural source for the first time.

Compound **5**, designated as myrrhalaanostenol was obtained as a light brown mass from petroleum ether-chloroform (1:1) eluants. Its IR spectrum displayed absorption bands for hydroxyl group (3440 cm<sup>-1</sup>), lactone group (1742 cm<sup>-1</sup>) and unsaturation (1645 cm<sup>-1</sup>). On the basis of mass and <sup>13</sup>C NMR spectra, the molecular ion peak of **5** has been established at  $m/z$  452 consistent with the molecular formula of a triterpenoid, C<sub>30</sub>H<sub>44</sub>O<sub>3</sub>. The fragment ion peaks at generating  $m/z$  150 [C<sub>6,7</sub>-C<sub>9,10</sub>, fission]<sup>+</sup>, 164 [C<sub>7,8</sub>-C<sub>9,10</sub>, fission]<sup>+</sup>, 192 [C<sub>8,14</sub>-C<sub>9,11</sub>, fission]<sup>+</sup>, 206 [C<sub>8,14</sub>-C<sub>11,12</sub>, fission]<sup>+</sup>, 232 and 220 [C<sub>8,14</sub>-C<sub>12,13</sub>, fission]<sup>+</sup> supported saturated nature of ring C, the presence of a vinylic linkage at C-5 and hydroxyl group in ring A. The other important peaks arising at  $m/z$  137 [C<sub>8</sub>H<sub>9</sub>O<sub>2</sub>, side chain], 313 [M-side chain-2H]<sup>+</sup>, 298 [313-Me]<sup>+</sup>, 280 [298-H<sub>2</sub>O]<sup>+</sup> and 95 [232-side chain]<sup>+</sup> indicated the presence of a C<sub>8</sub>-side chain with lactone ring and saturated ring D. The <sup>1</sup>H NMR spectrum of **5** showed three one-proton downfield double-doublets at δ 5.60 (*J*=7.5, 5.6 Hz), 5.52 (*J*=7.5, 4.9 Hz) and 5.37 (*J*=7.3, 10.7 Hz) assigned correspondingly to cis-oriented H-23, H-22, and H-6 vinylic protons, respectively. A two-proton broad signal at δ 4.84 was ascribed to H<sub>2</sub>-26 methylene protons. A doublet and a double doublet, one-proton each, at δ 4.59 (*J*=5.6 Hz) and 3.25 (*J*=8.7, 4.5 Hz) were attributed to oxygenated methine H-24β and carbinol H-3α protons, respectively. Six three-

proton broad singlets at  $\delta$  1.67, 1.16, 1.12, 1.09, 1.01 and 0.96 were accounted correspondingly to C-26 methyl protons attached to a vinylic carbon and to tertiary C-19, C-29, C-28, C-30 and C-18 methyl protons. The  $^{13}\text{C}$  NMR spectrum of **5** exhibited 30 carbon signals. The important signals appeared for vinylic carbons at  $\delta$  142.33 (C-5), 122.76 (C-6), 137.39 (C-22), 137.01 (C-23), 147.48 (C-25) and 107.81 (C-26), lactone carbon at  $\delta$  172.81 (C-21) and oxygenated methine carbons at  $\delta$  76.56 (C-3) and 86.02 (C-24). The  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectral data of **5** were compared with the lanosteryl-type triterpenoids [13-15]. On the basis of above discussion the structure of the **5** was elucidated as lanost-5, (Z)-22,25(27)-trien-3 $\beta$ -ol-21,24 $\alpha$ -olide (Figure 1). It is a new lanostene-type triterpenoid isolated from a natural source.

Compound **6**, designated as myrrhalanostenoic acid was obtained as a colourless solid mass from chloroform eluants. It responded positively to tests for triterpenoids and produced effervescences with sodium bicarbonate solution. Its IR spectrum exhibited important absorption bands for hydroxyl group ( $3425\text{ cm}^{-1}$ ), carboxyl group ( $3218, 1680\text{ cm}^{-1}$ ), unsaturation ( $1645\text{ cm}^{-1}$ ) and lactone ring ( $1740\text{ cm}^{-1}$ ). Its molecular weight was established at  $m/z$  486 on the basis of +ve FAB mass and  $^{13}\text{C}$  NMR spectra consistent with the molecular formula of a triterpenic acid,  $\text{C}_{30}\text{H}_{46}\text{O}_5$ . The ion peaks generating at  $m/z$  334, 152 [ $\text{C}_{6,7}\text{-C}_{9,10}$  fission] $^+$  and 320, 166 [ $\text{C}_{7,8}\text{-C}_{9,10}$  fission] $^+$  indicated the presence of olefinic linkage in ring B at C-5, and the hydroxyl group in ring A which was placed at C-3 on the biogenetic considerations. The diagnostic ion peaks arising at  $m/z$  192, 294 [ $\text{C}_{8,14}\text{-C}_{9,11}$  fission] $^+$ , 206, 280 [ $\text{C}_{8,14}\text{-C}_{11,12}$  fission] $^+$  and 266, 220 [ $\text{C}_{8,14}\text{-C}_{12,13}$  fission] $^+$  suggested the saturated nature of ring C. The other fragment ion peaks at  $m/z$  171 [ $\text{C}_8\text{H}_{11}\text{O}_4$ , side chain (SC)] $^+$ , 300 [M-side chain-Me] $^+$  and 297 [M-side chain- $\text{H}_2\text{O}$ ] $^+$  supported the presence of  $\text{C}_8$ -side chain containing a lactone moiety and carboxylic group and saturated ring D. The  $^1\text{H}$  NMR spectrum of **6** exhibited a one-proton downfield signal at  $\delta$  5.03 attributed to vinylic H-6 proton. A one-proton broad multiplet at  $\delta$  4.82 with half-width value ( $w_{1/2}=9.2\text{ Hz}$ ) was ascribed to oxygenated methine H-24 proton placed in  $\beta$ -orientation. Another one-proton double-doublet at  $\delta$  3.34 ( $J=3.6, 4.5\text{ Hz}$ ) was ascribed to  $\beta$ -oriented H-3 carbinol proton. Five three-proton broad singlets at  $\delta$  1.12, 1.08, 1.03, 0.98, and 0.77 were attributed to C-19, C-28, C-29, C-30 and C-18 tertiary methyl protons, respectively, all attached to the saturated carbons. A three-proton doublet at  $\delta$  0.85 ( $J=6.5\text{ Hz}$ ) was assigned to C-27 secondary methyl protons. The  $^{13}\text{C}$  NMR spectrum of **6** showed 30 carbon signals and the important signals were observed for  $\delta$ -lactone at  $\delta$  173.08 (C-21) and 82.65 (C-24), carboxylic carbon at 181.57 (C-26), vinylic carbons at  $\delta$  141.35 (C-5) and 121.48 (C-6), carbinol carbon at 80.27 (C-3) and methyl carbons between  $\delta$  28.41-14.89. The  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR values of **6** were compared with lanostene-type triterpenoids [13-15]. On the basis of these evidences the structure of **6** has been established as lanost-5-en-3 $\alpha$ -ol-21, 24 $\alpha$ -olide-26-oic acid (Figure 1). This is a new triterpenic acid isolated from a natural source.

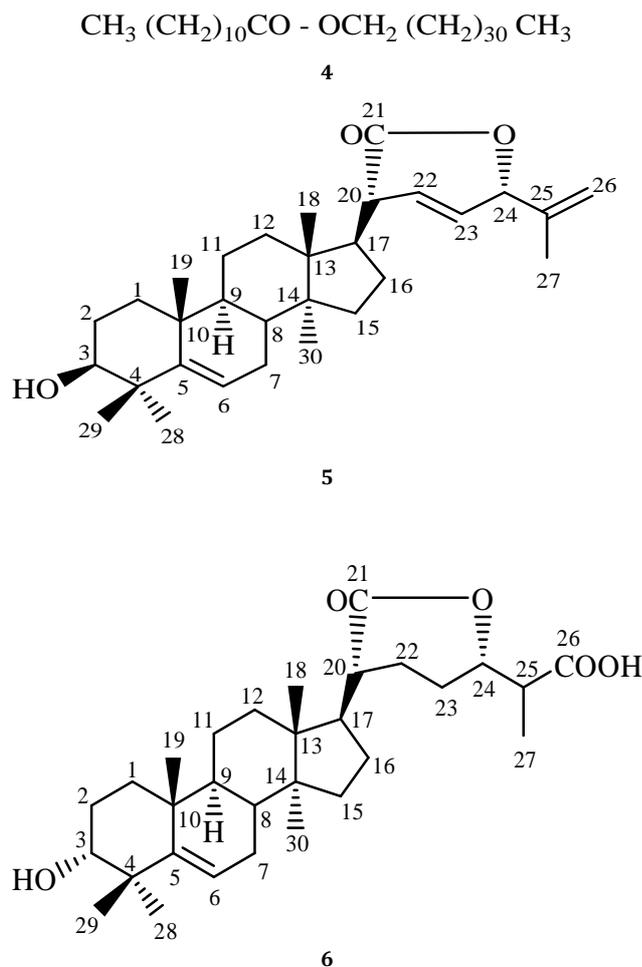
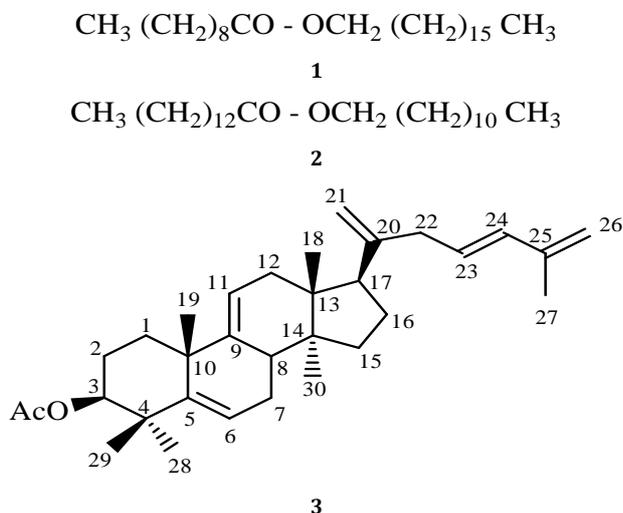


Fig. 1: Structures of compound 1-6.

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