Chemical Constituents of *Crataeva nurvala* (Buch-Ham) Leaves

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Chemical investigation of *Crataeva nurvala* leaves resulted in the isolation of four compounds, which are dodecanoic anhydride, methyl pentacosanoate, kaemferol-3-O-α-D-glucoside and quercitin-3-O-α-D-glucoside. Dodecanoic anhydride and methyl pentacosanoate are being reported for the first time from this plant. Kaemferol-3-O-α-D-glucoside and quercitin-3-O-α-D-glucoside have already been reported from this plant.

The genus *Crataeva* (family: Capparidaceae) is named in honour of the Greek botanist Crataevas. *Crataeva nurvala* is commonly known as *barna* and *varuna*[1] and distributed, throughout India and tropical regions of the world: wild or cultivated[2]. It is often found along streams and also in dry, deep boulder formations in sub-Himalayan tract[3]. It is useful as a laxative, antipyretic, antilithic, antihelminthic, diuretic, demulcent, stomachic, alterative tonic in chest and blood diseases and is reported to cure disorders of urinary organs[4]. It is very useful as antiinflammatory drug and acts as a good

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contraceptive for women. This plant is known to possess immense pharmacological activity and antilithic properties[5]. The major component isolated from this plant is lupeol, which is used to treat hypercrystalluria, hyperoxaluria and hypercalciuria[6]. The compound is also widely used to treat urinary disorders like urolithiasis, and it decreases elevated concentration of oxalate, phosphorous and magnesium in renal tissue[7]. Lupeol also possesses antipyretic, analgesic, antiinflammatory activity[8]. Since there is scanty data on the chemical components of its leaves, we have undertaken the present study.

The melting points were determined on Ganson electrical melting point apparatus. ^{1}H NMR spectra were recorded on Bruker AC-300F 300 MHz NMR spectrometer in $CDCl_3$ using TMS as internal standard. Chemical shifts are given in δ (ppm), and $CDCl_3$ was used as solvent. IR spectra were recorded on Hitachi 570 infrared spectrophotometer. Mass spectra were recorded on VG-70S 11-250*J* GC-MS-DS mass spectrometer.

Leaves of *Crataeva nurvala* (5 kg) were collected from Landscape, CCS H.A.U., Hisar. These were crushed, dried and extracted with hot methanol, each time refluxing for 6 h. The methanolic extract was concentrated over water bath under reduced pressure. The extractives were then subjected to silica gel (60-120 mesh) column chromatography. The column chromatography of *Crataeva nurvala* leaves afforded four compounds (A-D) using petroleum ether, benzene, ethyl acetate, methanol and their mixtures as eluents, as shown in the Table 1.

Compound A (dodecanoic anhydride, 1, fig. 1) was obtained on elution with benzene-petroleum ether (1:9) and it crystallized from benzene, 10 mg, mp: 45°[9]. IR (K Br, ν_{max} in cm^{-1}): 721, 798, 1023, 1163, 1257, 1463, 1731, 2848, 2914; ^{1}H NMR ($CDCl_3$) δ, ppm: 2.25 (4H, t, *J* 7.0 Hz, 2 x -CH_2COO-), 1.60 (4H, m, 2 x -CH_2CH_2COO-), 1.25 (32H, br, 16 x -CH_2-), 0.88 (6H, t, *J* 7.5 Hz, 2 x -CH_3); GC-MS (m/z), 382 (M^+), 354, 204, 176, 161, 133, 91.

TABLE 1: COMPOUNDS ISOLATED FROM THE LEAVES OF *CRATAEVA NURVALA*

Compound	Solvent system	Volume (ml)
-	Petroleum ether	124×500
Compound A	Benzene-Petroleum ether (1:9)	39×500
Compound B	Benzene-Petroleum ether (1:3)	34×500
-	Benzene-Petroleum ether (1:1)	30×500
-	Benzene	27×500
	Ethyl acetate-Benzene (1:19)	30×500
-	Ethyl acetate-Benzene (1:9)	30×500
-	Ethyl acetate-Benzene (1:3)	31×500
-	Ethyl acetate-Benzene (1:1)	24×500
-	Ethyl acetate	25×500
Compound C	Methanol-Ethyl acetate (1:49)	25×500
-	Methanol-Ethyl acetate (1:19)	30×500
-	Methanol-Ethyl acetate (1:9)	20×500
Compound D	Methanol-Ethyl acetate (1:3)	40×500

Compound B (methyl pentacosanoate, 2) was obtained on elution with benzene-petroleum ether (1:3), 10 mg, mp: 62°[10]. IR (K Br, ν_{max} in cm^{-1}): 668, 758, 1215, 1710, 2401, 2917, 3020. ^{1}H NMR ($CDCl_3$) δ, ppm: 3.64 (3H, s, -OMe), 2.17 (2H, t, *J* 7.0 Hz, -CH_2COOMe), 1.54 (2H, m, -CH_2CH_2COOMe), 1.25 (42H, br, 21x -CH_2-), 0.88 (3H, t, *J* 7.05 Hz, -CH_3); GC-MS (m/z): 396 (M^+), 380, 281, 261, 254, 207, 157,148, 135, 122, 118, 105, 98, 95.

Compound C (kaempferol-3-O-α-D-glucoside, 3) was obtained on elution with methanol-ethyl acetate (1:49), 35 mg, mp: 178°[11]. It gave positive Mg/HCl test. IR (K Br, ν_{max} in cm^{-1}): 671, 801, 907, 1220, 1371, 1439, 1634, 2364, 2931, 3484. The compound was acetylated with Ac_2O/Py: mp: 178°[11] and its ^{1}H NMR ($CDCl_3$) δ, ppm: 7.92 (2H, d, *J* 7.0 Hz, H-2', H-6'), 7.26 (2H, d, *J* 7.0 Hz, H-3', H-5'), 7.08 (1H, d, *J* 2.0 Hz, H-8), 6.78 (1H, d, *J* 2.0 Hz, H-6), 3.94-

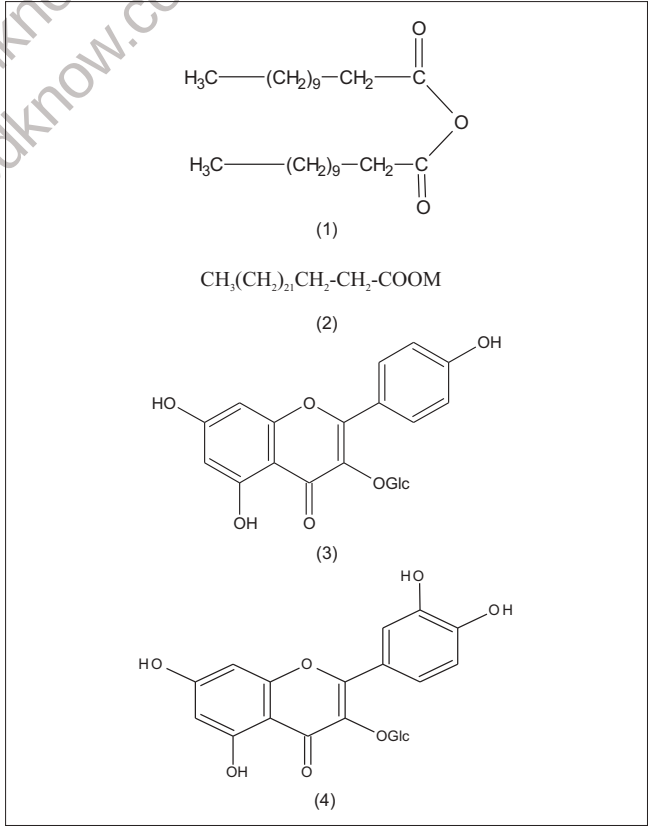

Fig 1: Structures of four compounds isolated from *Crataeva nurvala* leaves
1. Dodecanoic anhydride, 2. Methyl pentacosanoate, 3. Kaempferol-3-O-α-D-glucoside and 4. Quercitin-3-O-α-D-glucoside

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5.64 (7H, m, 7H of sugar), 2.33 (3H, s, -OAc), 2.17(6H, s, 2 x -OAc), 2.12 (3H, s, -OAc), 2.06 (3H, s, -OAc), 2.04 (3H, s, -OAc), 2.00 (3H, s, -OAc), 1.98 (3H, s, -OAc); GC-MS (m/z), 448 (M^{+}), 279, 207, 167, 149, 132, 104, 83.

Compound D (quercitin-3-O-α-D-glucoside, 4) was obtained on elution with methanol-ethyl acetate (1:3), 40 mg, mp: 238°[12]. It responded to colour reaction with Mg/HCl. IR (K Br, ν_{max} in cm^{-1}): 671, 801, 907, 1220, 1371, 1439, 1634, 2364, 2931, 3484. The compound was acetylated with Ac_2O/Py: mp: 238°[12] and its ^1H NMR ($CDCl_3$) δ, ppm: 7.89 (2H, m, *J* 7.0 Hz, H-2'), 7.98 (2H, dd, *J* 2.0 Hz, *J* 7.0 Hz, H-6'), 7.26 (1H, m, H-5'), 7.09 (1 H, d, *J* 2.0 Hz, H-8), 6.78 (1 H, d, *J* 2.0 Hz, H-6), 3.92-5.60 (7H, m, 7H of sugar), 2.40 (3H, s, -OAc), 2.33(3H, s, -OAc), 2.17(3H, s, -OAc), 2.12 (3H, s, -OAc), 2.06 (3H, s, -OAc), 2.04 (3H, s, -OAc), 2.00 (3H, s, -OAc), 1.98 (3H, s, -OAc); GC-MS (m/z) 464 (M^{+}), 279, 207, 170, 128, 97.

Kaemferol-3-O-α-D-glucoside and quercitin-3-O-α-D-glucoside have already been reported from this plant, while dodecanoic anhydride and methyl pentacosanoate are being reported for the first time from this plant. 3-O-methyl quercitin and quercitin are also being reported from the leaves of this plant[13].

ACKNOWLEDGEMENTS

Authors are thankful to Landscape Officer, CCS H.A.U., Hisar, for the supply of plant material.

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Accepted 23 December 2006
Revised 6 March 2006
Received 14 October 2005
Indian J. Pharm. Sci., 2006, 68 (6): 804-806

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