Phytochemical Examination of *Corchorus olitorius* Leaves

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ABSTRACT

From the leaf extract of *Corchorus olitorius* L. a rare compound fusidic acid, betulinic acid and cannogenol were isolated and characterized by spectroscopy.

Key Words: fusidic acid, betulinic acid and cannogenol

INTRODUCTION

The Mediterranean basin contains approximately 25,000 plant species, about half of which are endemic to the region, and is one of the world’s major centres of plant diversity.[1] *Corchorus olitorius* is a Tiliaceae member spread throughout India. Biologically *Corchorus* species are used as diuretic, chronic cystitis, antihistaminic, antimicrobial and cardiotonic, [2-3]

Plant material: The leaves of *Corchorus olitorius*, were collected from Warangal in September 2007 (1.5kg) and was authenticated by Prof.V.S. Raju, Department of Botany, Kakatiya University, Warangal. A specimen was deposited in the Herbarium (Voucher specimen number (CO/07) leaves were collected from the plant and dried under shade.

Extraction: The leaves of *Corchorus olitorius* (1.5kg) were air dried and coarsely powdered in a Wiley mill and successively extracted with petroleum ether (3×3 l), chloroform (3×3 l) and methanol (3×3 l) and concentrated under reduced pressure. The petroleum ether, chloroform extracts of *C. olitorius* leaves shown similar spots on TLC (1:1 Benzene: Chloroform) and hence combined and column chromatographed over silica gel (Acme 100 mesh), which afforded one compound named as COL-1. The methanolic extract showed positive Liebermann-Burchard test for terpenoids and Kedde test for cardiac glycosides. On column chromatography the methanolic extract gave two compounds COL-2 and COL-3.

Characterization of Isolated Compounds: COL-1 (Betulinic acid, 10mg): It was crystallized from chloroform as white fluffy needles, m.p 276-278°C. It gave positive Liebermann-

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Burchard test (pink colour) for terpenoids. This observation was supported by ms: m/z 456[M]+, 423, 411, 410, 342, 248, 220, 207, 203, 189, 143, 69 suggested the molecular formula C₃₀H₄₈O₃. IR (KBr, cm⁻¹) : 3385 (OH), 3350 (COOH), 1715 cm⁻¹ (C=O); ¹H NMR (δ, CDCl₃) : 4.56 and 4.68 (=CH₂), 1.68 (s, =C-CH₃), 2.30 (m, H-19) 3.27 (dd, H-3α), 0.76 (s, 3H), 0.78 (s, 3H), 0.82 (s, 3H), 0.96 (s, 3H), 1.03 (s, 3H) for five tertiary methyl groups; ¹³C NMR (δ, CDCl₃) : 38.7 (C-1), 27.4 (C-2), 78.9 (C-3), 38.8 (C-4), 55.3 (C-5), 18.3 (C-6), 34.3 (C-7), 40.7 (C-8), 50.5 (C-9), 37.2 (C-10), 20.8 (C-11), 25.5 (C-12), 38.4 (C-13), 42.4 (C-14), 30.5 (C-15), 32.1 (C-16), 56.3 (C-17), 46.8 (C-18), 49.2 (C-19), 150.3 (C-20), 29.7 (C-21), 37.0 (C-22), 27.9 (C-23), 15.3 (C-24), 16.0 (C-25), 16.1 (C-26), 14.7 (C-27), 180.5 (C-28), 09.6 (C-29), 19.4 (C-
30). The above mentioned spectral data were in close agreement with literature value of betulinic acid. Thus, compound COL-1 was characterized as betulinic acid \[^{[4-5]}\]

COL-2 (Cannogenol, 8 mg): It was obtained as white amorphous powder in 30% methanol: chloroform. It showed positive kedde and legal reactions indicating the cardinolide nature of the compound. In the high resolution negative ion FAB mass spectrum, COL-2 showed a \([\text{M-H}]^-\) ion peak at m/z 681.3436. The fragment ion peaks of low resolution FABMS, m/z 519 for \([\text{M-H}-162]^-\) and 389 for [aglycone –H], were observed. COL-2 had more mass units from digitoxigenin, and one extra hydroxyl group in the aglycone. The C-19 signal of COL-2 was observed at δ 66.0 shifted by +41.7 ppm. The signals of C-1 (δ 24.8, -6.6 ppm), C-5 (δ 30.2 7.7 ppm) and C-10 (δ 40.4, -4.1 ppm) were significantly shifted. The \(^{1}H\) NMR, H-H COSY and HMQC spectra, two protons at the 19-position were assigned at δ3.41 and 3.81. These data indicated that the aglycone was cannogenol which had one hydroxyl at C-19 \[^{[6-7]}\]. The \(^{1}H\) NMR showed signals as δ 0.88 (3H, s, H3 -18), 1.25(3H,d,J=6.5Hz, bio H3 -6), 2.82 (1H, m, H-17), 3.41, 3.81 (1H,d,J=11Hz, H2-19 ), 3.45 (1H, m, bio H-4 ), 3.65 (1H, dd, J=5.5, 12.0 Hz, glc H-6b), 4.04 (1H, m, H-3 ), 4.15 (1H, br.q, bio H-3), 4.31 (1H, d, J=8.0Hz, glc H-1), 4.88 (1H, dd, J=1.5,18.5Hz, H2-21), 5.89 (1H, s, H-22). Based on the data, the compound was identified as cannogenol.

COL-3 (Fusidic acid, 20mg): It was obtained as colourless substance in 40% methanol in chloroform. Molecular Formula is C\(_{31}\)H\(_{48}\)O\(_{6}\) and its m.p.190-192\(^{0}\)C. IR (KBr): \(\text{cm}^{-1}: 3369.62, 2924.39, 715.97, 1696.02, 1558.27, 1436.56, 1375.42, 1255.07, 1053.01, 934.01, 653.86.\) UV \(\lambda_{\text{max}}:\) (log ε): 233 (3.96) nm. EI-MS: 475.3422 [M+H]. The \(^{1}H\) NMR: 1.83, 1.80, 3.76, 1.58, 2.14, 1.40, 1.43, 1.58,4.35, ,12, 3.06, 1.73, 5.90, 0.92, 0.98, 2.52, 2.14, 5.12, 1.60, 1.67, 0.91,1.39, acetyl 1.96. \(^{13}C\)NMR: 30.17 ,29.84 3, 71.53 , 36.38, 6.01,20.87, 32.14, 39.48, 49.32, 36.95,68.24, 35.58, 44.29, 48.72, 38.96, 74.47, 150.75, 17.78, 22.99, 129.64, 174.37, 28.77, 28.46, 123.10, 132.58, 17.84, 25.71, 15.92,23.94,CO170.70, COCH\(_3\) 20.60, \[^{[8-26]}\] Based on the above spectral data, the compound COL-3 was identified as fusidic acid.

**RESULTS AND DISCUSSION**

The chemical examination of the leaves of *C. olitorius* on conventional extraction and a sequence of chromatographic methods afforded three compounds. These are characterized as betulinic acid, cannogenol and fusidic acid. Out of these compounds, fusidic acids were reported for the first time from *C. olitorius* leaves.
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REFERENCES


