PERGAMON

Phytochemistry 50 (1999) 1417–1418

PHYTOCHEMISTRY

A prenylated dihydroflavonol from *Mundulea suberosa*

E. Venkata Rao *, P. Sridhar, B.V.L. Narasimha Rao, P. Ellaiah

Department of Pharmaceutical Sciences, Andhra University, Visakhapatnam 530 003, India

Received 22 May 1998

Abstract

A new prenylated dihydroflavonol was isolated from *Mundulea suberosa* and characterised as 5-methyl lupinifolinol by spectral data. Its antibacterial activity was studied.

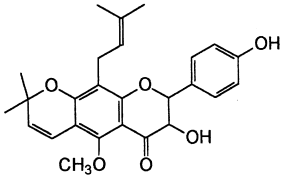
Keywords: Mundulea suberosa; Leguminosae; Prenylated dihydroflavonol; 5-Methyl lupinifolinol; Antibacterial activity

1. Introduction

Previous chemical investigations of *Mundulea* species (Leguminosae) have revealed that they are rich sources of flavonoids (Srimannarayana & Subba Rao, 1974; Venkata Rao, Sridhar & Rajendra Prasad, 1997; Van Zyl et al., 1979; Satyanarayana, Anjaneyulu & Viswanadham, 1996). Recently, we reported the isolation of two new prenylated flavanones, mundulea flavanones A & B from *M. suberosa* Benth (Venkata Rao et al., 1997). The present communication describes the isolation and structural elucidation of a new prenylated dihydroflavonol, designated as 5-methyl lupinifolinol (**1**).

2. Results and discussion

Compound **1** showed a $[M]^+$ at *m/z* 436 consistent with the formula $C_{26}H_{28}O_6$. Its IR spectrum showed hydroxyl absorption at 3427 cm^{-1}. Its ^1H NMR [δ 4.95 (1H, *d*, $J = 12$ Hz), 4.42 (1H, *br d*, $J = 12$ Hz), 4.1 (1H, *br s*, D_2O exchangeable) and ^{13}C NMR [δ 82.7 (C-2), 73.1 (C-3)] spectral data clearly indicated it to be a dihydroflavonol (Harborne & Mabry, 1982). The ^1H NMR also indicated the presence of a 3-methylbut–2-enyl group, a dimethylchromeno ring and a methoxyl group. It showed a blue fluorescence under UV light characteristic of 5-methoxy flavonoids. The presence of two *ortho* coupled doublets in ^1H NMR at δ 7.4 and 6.85 and a fragment ion at *m/z* 136 in the EIMS spectrum indicated the B-ring as 4′-hydroxy phenyl. From the ^1H NMR data it is evident that **1** is closely related to lupinifolinol, previously isolated from *Tephrosia lupinifolia* (Smalberger, Vleggar & Weber, 1974) and also reported from *M. sericea* (Van Zyl, Rall & Roux, 1979). Thus, from the NMR data and colour reactions, **1** is characterised as 5-methyl lupinifolinol. In addition to lupinifolinol, three other dihydroflavonols, mundulinol **2**, (Van Zyl et al., 1979),



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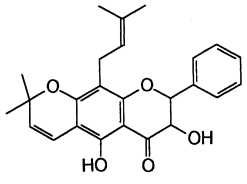

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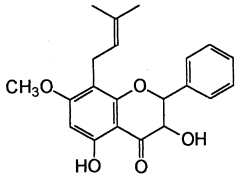

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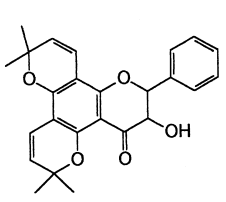

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* Corresponding author.

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PII: S0031-9422(98)00574-3

3 and **4** (Satyanarayana et al., 1996) have been reported from *Mundulea* species (Van Zyl et al., 1979; Satyanarayana et al., 1996) and 3-methyl luipinifolinol has been reported from *Lonchocarpus guatamalensis* (Ingham, Tahara & Dziedzic, 1988).

The antibacterial activity of **1** was tested against *Bacillus subtilis* and *Pseudomonas aeruginosa*. The compound showed significant antibacterial activity against both these organisms.

3. Experimental

General Mps. were uncorr. ^{1}H NMR: 400 MHz on Bruker VM-400 FT NMR spectrometer and ^{13}C NMR: 22.5 MHz on Jeol Ex-90 FT NMR spectrometer using $CDCl_3$ as the solvent and TMS as standard reference. Nutrient Agar medium for antibacterial activity.

3.1. Plant material

Stem bark of *M. suberosa* Benth was collected in February 1993, near Coimbatore, Tamil Nadu, India by Dr. P. Santhan of SPIC Pharmaceutical Division, Madras, who confirmed its identification.

3.2. Extraction and isolation

The powdered stem bark (450 g) was extracted repeatedly with $CHCl_3$. After removal of solvent, the residue (13 g) was fractionated into hexane solubles (7 g) and hexane insolubles (6 g). CC of the latter over Silica gel (ACME, 100–200 #) yielded **1** (28 mg) in the hexane:EtOAc (4:1) fraction. It was detected by UV and heating the plates to 100° after spraying with 5% methanolic H_2SO_4.

3.3. 5-Methyl lupinifolinol (*1*)

Compound **1** was obtained as crystals mp 174–176°; $[\alpha]_D^{25}$ +43.17° (MeOH: c 0.12); IR υ_{max}^{KBr} cm^{-1}: 3427 (OH), 2922 (>C=CH), 1670 (>C=O), 1593 and UV $\lambda_{max}^{CHCl_3}$ nm 269, 348. For ^{1}H & ^{13}C NMR, see Table 1. EIMS: *m/z* (rel. int.): 436 [M]$^+$ (35), 420 (25), 405 (22.5), 329 (100), 301 (44), 285 (58), 245 (80), 136 (18).

3.4. Antibacterial activity

Compound **1** was tested for antibacterial activity using the paper disc (8 mm dia.) method on *Bacillus subtilis* and *Pseudomonas aeruginosa* and 20 μL aliquots of test solution. Minimum growth inhibitory concentration was found to be 0.01 μg ml^{-1} for both the organisms.

Table 1
^{1}H and ^{13}C NMR spectral data of **1** (δ ppm, $CDCl_3$).

Position	^{1}H (400 MHz)	^{13}C (22.5 MHz)
2	4.95 (2H, *d*, *J* = 12 Hz)	82.7
3	4.42 (1H, *br d*, *J* = 12 Hz)	73.1
3-OH	4.1 (1H, *br s*, D_2O exchangeable)	
4		191.3
5		161.0
6		113.8
7		160.0
8		105.4
9		159.0
10		103.0
1′		128.7
2′, 6′	7.4 (2H, *d*, *J* = 9 Hz)	128.9
3′, 5′	6.85 (2H, *d*, *J* = 9 Hz)	115.5
4′		156.4
1″		
2″		77.9
3″	5.65 (1H, *d*, *J* = 9 Hz)	128.7
4″	6.65 (1H, *d*, *J* = 9 Hz)	116.1
5″,6″	1.45 (6H, *s*)	28.3
1‴	3.25 (2H, *d*, *J* = 7 Hz)	21.8
2‴	5.15 (1H, *t*, *J* = 7 Hz)	121.8
3‴		131.6
4‴,5‴	1.6 (6H, *s*)	17.8 & 25.8
OMe	3.85 (3H, *s*)	62.5

Acknowledgements

The authors thank the UGC, New Delhi for financial support, Dr. P. Santhan, SPIC Pharmaceutical Division, Madras for provision and identification of the plant material and Dr. Y. Rajendra Prasad for helpful discussions. Thanks are also due to Head, RSIC of CDRI, Lucknow and Co-ordinator, UGC Cosist programme, School of Chemistry, Andhra University for spectral data.

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