TERPENES AND PHENOLIC COMPOUNDS OF *Murraya koenigii*

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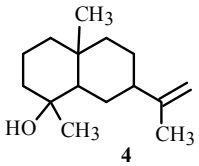
Murraya koenigii (L.) Spreng, an evergreen plant, is mostly distributed in tropical and subtropical regions [1]. It belongs to the *Murraya* genus of the *Rutaceae* family, which is widely grown in home gardens in Malaysia for its aromatic leaves and as one of the important ingredients in Indian cuisine. Previous phytochemical studies on *M. koenigii* revealed the presence of carbazole alkaloids [2–7] and coumarins [8]. Herein, we present data on the isolation and identification of three triterpenes and two phenolic compounds from the hexane crude extracts of the bark and leaves of *M. koenigii* collected from Pahang, Malaysia. The hexane crude extract of the bark (30.0 g) was chromatographed over silica gel $60F_{254}$ (70–230 mesh) and extensively subjected to silica gel $60F_{254}$ (230–400 mesh) column chromatography and preparative TLC on silica gel GF_{254}, leading to the isolation of compounds **1**–**3**, and **5**. Meanwhile, compounds **1**, **4**, and **6** were isolated from the leaves hexane extract (20.0 g) of *M. koenigii*.



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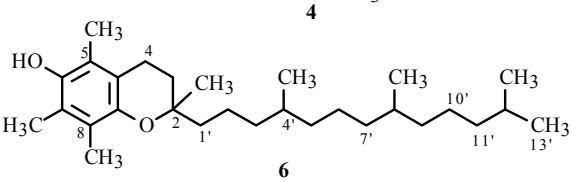

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The structures of these compounds were established by 1D (^{1}H, ^{13}C, DEPT) and 2D (COSY, HMQC, HMBC) NMR, IR, UV, and MS (HR-ESI-MS) analysis. All the data were in good agreement with the respective literature data.

Compound 1, $C_{30}H_{50}$, identified as squalene [9, 10].

Compound 2, $C_{29}H_{50}O$, mp 134–136°C, identified as β-sitosterol [11].

Compound 3, $C_{29}H_{48}O$, identified as stigmast-4-en-3-one [12].

Compound 4, $C_{15}H_{26}O$, mp 60–62°C, identified as selin-11-en-4α-ol [13].

Compound 5, $C_{10}H_{12}O_4$, mp 187–188°C, identified as 2-hydroxy-4-methoxy-3,6-dimethylbenzoic acid [14].

Compound 6, $C_{29}H_{50}O_2$, colorless oil. $[\alpha]_D^{25}$ +16.0° (*c* 0.02, CH_3OH). UV (CH_3OH, λ_{max}, nm): 225, 254, 268, 288. IR (CH_3OH, ν_{max}, cm^{-1}): 3327, 1452. HR-ESI-MS *m/z* 430.2458 $[M]^+$. ^{1}H NMR (500 MHz, $CDCl_3$, δ, ppm, J/Hz): 1.78 (2H, m, H-3), 2.60 (2H, t, J = 13.8, H-4), 1.23 (3H, s, 2-CH_3), 2.11 (3H, s, 5-CH_3), 4.20 (1H, s, 6-OH), 2.16 (3H, s, 7-CH_3), 2.11 (3H, s, 8-CH_3), 1.48 (1H, m, H-1′a), 1.53 (1H, m, H-1′b), 1.38 (2H, m, H-2′), 1.06 (1H, m, H-3′a), 1.25 (1H, m, H-3′b), 1.38 (1H, m, H-4′), 1.30 (2H, m, H-5′), 1.15 (2H, m, H-6′), 1.30 (2H, m, H-7′), 1.38 (1H, m, H-8′), 1.30 (2H, m, H-9′), 1.05 (2H, m, H-10′), 1.14 (2H, m, H-11′), 1.51 (1H, m, H-12′), 0.87 (3H, d, J = 6.9, H-13′), 0.84 (3H, d, J = 6.9, 4′-CH_3), 0.85 (3H, d, J = 6.9, 8′-CH_3), 0.86 (3H, d, J = 6.9, 12′-CH_3). It was identified as α-tocopherol [15].

To the best of our knowledge, this is the first report presented on the isolation and structural elucidation of compounds **1**–**6** from *M. koenigii*. These compounds were also investigated for their cytotoxic activities against HL-60 and HeLa cell lines via MTT methodology. β-Sitosterol (**2**) and 2-hydroxy-4-methoxy-3,6-dimethylbenzoic acid (**5**) showed strong activities against both HL-60 (CD_{50} = 8.6 and 1.5 μg/mL, respectively) and HeLa (CD_{50} = 0.9 and 11.2 μg/mL, respectively) cell lines *in vitro*. The other compounds were moderately active against both cell lines with CD_{50} values less than 60 μg/mL. *M. koenigii* is a proven promising source of bioactive compounds.

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