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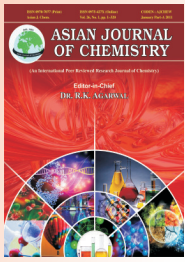

A New Xanthone from *Garcinia oligantha* and Its Cytotoxicity

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A new xanthone, methyl 6-(2-acetoxyethyl)-4,8-dihydroxy-9-oxo-9*H*-xanthene-1-carboxylate (**1**), was isolated from the stems of *Garcinia oligantha*. Its structure was elucidated by spectroscopic methods, including extensive 1D and 2D NMR techniques. Compound **1** was tested for their cytotoxicities against five human tumor cell lines (NB4, A549, SHSY5Y, PC3 and MCF7) and it exhibited moderate cytotoxicity against NB4, PC3 and MCF7 cell with IC_{50} values of 6.2, 3.8 and 5.4 μM, respectively.

Keywords: Xanthone, *Garcinia oligantha*, Cytotoxicities.

INTRODUCTION

The species of *Garcinia oligantha* are one of the plants belonging to Garcinia genus. This species distributed in the south of Yunnan and Guangxi Province of China[1]. Plants of the genus *Garcinia* (Guttiferae) has been extensively investigated from the phytochemical and biological points of view. Xanthones[2-5], benzophenones[4,6,7], depsidones[8-10], flavonoids[11,12], biflavonoids[13] and triterpenes[14] have been reported from Garcinia species.

In our previous studies, some apoptotic compounds were isolated from the stems of *Garcinia oligantha*[15]. With the aim of multipurpose utilization of Garcinia plants and identify bioactive natural products from this genus, the phytochemical investigation on *G. oligantha* was carried out. As a result, a new xanthone (**1**) was isolated from this plant. The structure of **1** was elucidated on the basis of a comprehensive analysis of the ^{1}H NMR, ^{13}C NMR and 2D NMR spectra. In addition, the cytotoxicities of **1** were evaluated. The details of the isolation, structure elucidation and cytotoxicities of **1** are reported in this article.

EXPERIMENTAL

UV spectra were obtained using a Shimadzu UV-2401A spectrophotometer. IR spectra were obtained in KBr disc on a Bio-Rad Wininfmred spectrophotometer. ESI-MS were measured on a VG Auto Spec-3000 MS spectrometer. ^{1}H, ^{13}C and 2D NMR spectra were recorded on Bruker DRX-500 instrument with TMS as internal standard. Column chromatography was performed on silica gel (200-300 mesh), or on silica gel H (10-40 mm, Qingdao Marine Chemical Inc., China). Second separate was used an Agilent 1100 HPLC equipped with ZORBAX-C18 (21.2 mm × 250 mm, 7 mm) column and DAD detector.

The tems of *Garcinia oligantha* were collected in Xishuangbanna Prefecture, Yunnan Province, P.R. China, in September 2011. The identification of the plant material was verified by Prof. Y.J. Chen (Yunnan Nationalities University). A voucher specimen (YNNI 11-9-38) has been deposited in our laboratory.

Extraction and isolation: The air-dried and powdered stems of *G. oligantha* (4.5 kg) were extracted four times with 70 % MeOH (4 × 5 L) at room temperature and filtered. The crude extract (115 g) was applied to silica gel (200-300 mesh) column chromatography, eluting with a $CHCl_3$-CH_3COCH_3 gradient system (20:1, 9:1, 8:2, 7:3, 6:4, 5:5), to give six fractions A-F. The further separation of fraction B (9:1, 2.94 g) by silica gel column chromatography and preparative HPLC (64 % MeOH, flow rate 12 mL/min) to give 1 (22.6 mg).

Methyl 6-(2-acetoxyethyl)-4,8-dihydroxy-9-oxo-9*H*-xanthene-1-carboxylate (1): Obtained as a yellow gum; UV (MeOH) λ_{max} (log ε) 210 (4.36), 242 (3.57), 308 (3.94) nm; IR (KBr, ν_{max}, cm^{-1}) 3425, 3076, 2916, 2876, 1742, 1726, 1650, 1604, 1548, 1460, 1375, 1126, 1065, 876, 764; ESIMS *m/z* (positive ion mode) 395 $[M+Na]^+$; HRESIMS (positive ion mode) *m/z* 395.0748 $[M+Na]^+$ (calcd. $C_{19}H_{16}O_8Na$ for 395.0743).

TABLE-1
^{1}H NMR AND ^{13}C NMR DATA OF COMPOUND **1** IN C_5D_5N (125 AND 500 MHz)

No.	δ_C (m)	δ_H (m, J, Hz)	No.	δ_C (m)	δ_H (m, J, Hz)
1	162.0		9a	106.9	
2	110.9	7.09 s	10a	147.1	
3	143.6		11	168.0	
4	108.1	7.21 s	12	38.0	2.59 (t, 7.2)
5	152.0		13	66.7	4.37 (t, 7.2)
6	120.2	7.42 (d, 9.0)	1-OMe	53.1	4.12 s
7	126.0	7.62 (d, 9.0)	13-OAc	169.8	
8	127.2			21.0	2.00 s
9	181.8		Ar-OH-1		12.83 s
4a	156.8		Ar-OH-5		12.56 s
8a	118.9				

RESULTS AND DISCUSSION

A 70 % aq. methanol extract prepared from the stems of *G. oligantha* was subjected repeatedly to column chromatography on Silica gel, Sephadex LH-20, RP-18 and Preparative HPLC to afford compound **1**. The structure of 1 was shown in Fig. 1. The ^{1}H and ^{13}C NMR data of **1** were listed in Table-1.

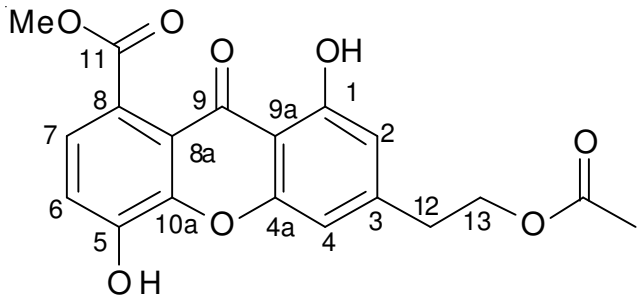

Fig. 1. The structures of new xanthone

Compound **1** was isolated as a yellow gum. The HRESIMS of **1** gave the pseudomolecular $[M+Na]^+$ ion at *m/z* 395.0748, corresponding to a molecular formula of $C_{19}H_{16}O_8$. The ^{1}H NMR spectra data (Table-1) showed the presence of two hydroxy groups, two *ortho* coupled aromatic protons, two *meta* coupled aromatic protons, two methylene protons and a acetoxyl proton. These signals could be attributed to a basic xanthone skeleton, an ethanol group and an acetoxy group. The appearance of the methylene protons (H_2-12) of the ethanol group at δ_H 2.59 together with ^3J cross-peaks in the HMBC spectrum (Fig. 2) with two aromatic methine carbon (C-2, δ_C 110.9; C-4, δ_C 108.1) and a quaternary aromatic carbon (C-3, δ_C 143.6) suggested that the ethanol group was at C-3. The correlation between one of the *ortho*-coupled aromatic protons (H-7, δ_H 7.62) and C-7 in the HSQC spectrum established the attachment of this proton at C-7. Thus, the other *ortho*-coupled aromatic proton at δ_H 7.42 was attributed to H-6. H-7 also gave HMBC cross-peaks with C-11 (δ_C 168.0) of the ester carbonyl side chain and an aromatic carbon C-8 (δ_C 127.2) in the HMBC spectrum. Thus, the methoxycarbonyl group was placed at C-8. Two hydroxy groups were assigned to C-1 and C-5 on the basis of HMBC correlations between the hydroxy proton (δ_H 12.83) and C-1 (δ_C 162.0), C-2 (δ_C 110.9) and C-9a (δ_C 106.9), as well as those between the other hydroxy proton (δ_H 12.56) and C-5 (δ_C 152.0), C-6 (δ_C 120.2) and C-10a (δ_C 147.1). Finally, an acetoxy group attached to C-13 was supported

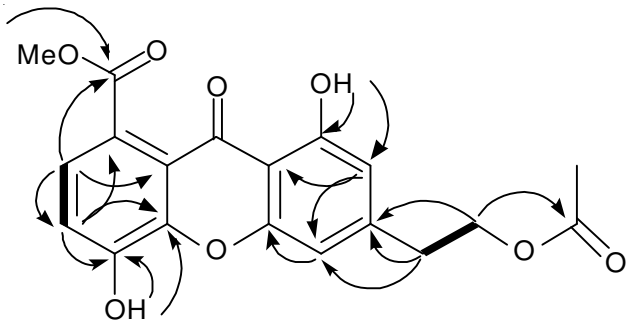

Fig. 2. Key HMBC (⌒) and ^{1}H-^{1}H COSY (—) correlations of **1**

by the HMBC correlation of H-13 (δ_H 4.37) with the carbonyl carbon (δ_C 169.8). Therefore, compound **1** was assigned as methyl 6-(2-acetoxyethyl)-4,8-dihydroxy-9-oxo- 9*H*-xanthene-1-carboxylate.

Compound **1** was tested for its cytotoxicity against five human tumor cell lines (NB4, A549, SHSY5Y, PC3 and MCF7) using the MTT method as reported previously[16]. Taxol was used as the positive control. The results shown that the compound **1** exhibited moderate cytotoxicity against NB4, PC3 and MCF7 cell with IC_{50} values of 6.2, 3.8 and 5.4 μM, respectively.

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