Research Article ISSN 2689-1050

Chemical & Pharmaceutical Research

A New Pyrone from *Elaeagnus Glabra*

Yang T.L.[1], Liu C.M.[2], Li W.J.[3], Li H.T.[4], Liu S.L.[5*] and Chen C.Y.[6*]

[1]*Department of Clinical Microbiology Laboratory, Yuan's General Hospital, Kaohsiung, Taiwan.*

[2]*School of Medicine, Yichun University, 576 XueFu Road, Yuanzhou District, Yichun 336000, China.*

[3]*School of Nursing, Fooyin University, Kaohsiung 83102, Taiwan.*

[4]*Department of Medical Laboratory Science and Biotechnology, Fooyin University, Kaohsiung, Taiwan.*

[5]*Experimental Forest College of Bioresources and Agriculture, National Taiwan University, Nantou County 55750, Taiwan.*

[6]*School of Medical and Health Sciences, Fooyin University, Kaohsiung 83102, Taiwan.*

***Correspondence:**

Chen C. Y., School of Medical and Health Sciences, Fooyin University, Kaohsiung 83102, Taiwan.

Liu S.L, Experimental Forest College of Bioresources and Agriculture, National Taiwan University, Zhushan Township, Nantou County 55750, Taiwan.

Received: 01 Feb 2022; **Accepted:** 25 Feb 2022; **Published:** 03 Mar 2022

Citation: Yang TL, Liu CM, Li WJ, et al. A New Pyrone from *Elaeagnus Glabra*. Chem Pharm Res. 2022; 4(2): 1-2.

ABSTRACT

A new 2-pyrone, elaeagpyrone (1) was isolated from the leaves of Elaeagnus glabra (Elaeagnaceae). The structure of the new 2-pyrone was elucidated by chemical and physical evidence.

Keywords

Elaeagnus glabra, Elaeagnaceae, 2-pyrone.

Introduction

There are about 90 species of Elaeagnus around the world. The majority are native to the temperate and subtropical regions in Asia, of which nine species can be found in Taiwan [1]. Many species of Elaeagnus are considered as folk medicinal plants, e.g., *E. umbellate* [2], *E. pungens* [3], *E. angustifolia* [4] and *E. multiflora* [5]. Triterpenoids, steroids and flavonoids have been isolated from several species of Elaeagnus e.g., *E. ungens* [6], *E. umbellate* [6], *E. bockii* [7], *E. orientalis* [8] and *E. pungens* [9]. In the course of screening for biologically and chemically novel agents from Formosan elaeagnaceous plants, E. glabra Thunb. was chosen for further phytochemical investigation. E. glabra Thunb. is an evergreen shrub or small tree with alternate leaves, inhabits East Asia and is reported to have anti-cancer, anti-bacterial, procoagulant, anti-asthmatic and anti-diarrheal effects [10]. These observations provide useful information for potential chemopreventive drug design. Previously, we isolated 16 compounds, including four flavonoids, six benzenoids and six steroids from the leaves of this plant [11]. In this paper, we report the isolation and structural elucidation of this new 2-pyrone.

Elaeagpyrone (1) was obtained as a white amorphous powder and its molecular formula was deduced as C8H8O4 by HRESIMS (m/z 191.0318 [M + Na]+; calc. 191.0320). The UV spectrum of 1 showed intense absorption bands at 205 and 252 nm, which were typical of a pyrone skeleton [12]. The IR spectrum of 1 exhibited absorption bands at λ 1720 and 1640 cm-1, indicating two carbonyl groups, respectively. The structure was confirmed from the 1H NMR spectrum, which contained signals at δ 6.37 (1H, dd, J = 9.2, 1.0 Hz, H-4), 7.82 (1H, d, J = 9.2 Hz, H-3) and 7.84 (1H, d, J = 1.0 Hz, H-6) on the pyrone ring, δ 3.39 (2H, s, H-7) and δ 3.75 (3H, s, OCH3). The 13C NMR and DEPT experiments for 1 showed eight resonance lines consisting of one methyl, one methylene, three methines, and three quaternary carbons (including two carbonyl signals at δ 159.7 and 174.5). The structure of 1 was also confirmed by 2D NMR experiments. A COSY correlation was observed between H-3 and H-4. The HETCOR experiment showed that the carbon signals at δ 117.9 for C-3, 147.1 for C-4, 153.8 for C-6, 30.5 for C-7 and 52.3 for OCH3 were correlated

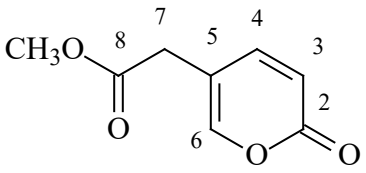
to the proton signals at δ 7.82 for H-3, δ 6.37 for H-4, δ 7.84 for H-6, δ 3.39 for H-7 and δ 3.75 for OCH3, respectively. The above results support the structure of 1, as a new 2-pyrone, methyl ester of 2-pyrone-5-acetic acid, which we name elaeagpyrone.

Experimental

General: IR, Hitachi 260-30 spectrophotometer; 1D and 2D NMR, Varian (Unity Plus) NMR spectrometer (400 MHz, using CDCl3 as solvents for measurement); Low-resolution ESI-MS, API 3000 (Applied Biosystems); High-resolution ESI-MS, Bruker Daltonics APEX II 30e spectrometer; Silica gel 60 for CC and precoated silica gel plates (Merck) were used for TLC, visualized with 10% H2SO4.

Plant Material: The specimen of E. glabra Thunb. was collected from Fuxing Township, Taoyuan City, Taiwan in March, 2014. A voucher specimen was identified by Professor Fu-Yuan Lu (Department of Forestry and Natural Resources College of Agriculture, National Chiayi University) and was deposited in the School of Medical and Health Sciences, Fooyin University, Kaohsiung, Taiwan.

Extraction and Isolation: The leaves (1.4 kg) of E. glabra were air dried and extracted repeatedly with MeOH (5 L × 3) at room temperature. The combined MeOH extracts (15.6 g) were then evaporated and further separated into 10 fractions by column chromatography on silica gel (4.2 kg, 70-230 mesh) with gradients of n-hexane/CH2Cl2/MeOH. Fraction 9 (2.4 g) was subjected to silica gel chromatography, eluting with CH2Cl2-MeOH (70:1), and enriched gradually with MeOH, to obtain four fractions (9-1–9-4). Fraction 9-2 (0.3 g) was further purified on a silica gel column using CH2Cl2/MeOH mixtures to obtain elaeagpyrone (1) (6 mg).



Elaeagpyrone (1): White amorphous powder; IR (neat) νmax: 1720 (C=O), 1640 (C=O) cm-1; UV/Vis (CH3CN): λmax (log ε): 252 (2.65), 205 (2.21) nm; MS (ESI): m/z (%): 191 [M + Na]+; HRMS-ESI: m/z [M + Na]+ calcd for C8H8O4Na: 191.0320; found: 191.0318; 1H NMR (400 MHz, CDCl3): 3.39 (2H, s, H-7), 3.75 (3H, s, OCH3) 6.37 (1H, dd, J = 9.2, 1.0 Hz, H-4), 7.82 (1H, d, J = 9.2 Hz, H-3), 7.84 (1H, d, J = 1.0 Hz, H-6); 13C NMR (100 MHz, CDCl3): 30.5 (C-7, CH2), 52.3 (OCH3, CH3) 117.9 (C-3, CH), 124.0 (C-5, C), 147.1 (C-4, CH), 153.8 (C-6, CH), 159.7 (C-2, C=O), 174.5 (C-8, C=O).

Acknowledgement

This investigation was supported by a grant from the Yuan's General Hospital (YGH-22-007) and the National Taiwan University.

References

1. Huang TS, Elaeagnaceae. In Flora of Taiwan, 2nd ed.; Editorial Committee of the Flora of Taiwan, Taipei, Taiwan, 1998; 3: 753.
2. Ahmad SD, Sabir MS, Juma M, et al. Morphological and biochemical variations in Elaeagnus umbellata Thunb. From mountains of Pakistan. Acta Bot Croat. 2005; 64: 121-128.
3. Yuebin G, Liu J, Su D. In vivo evaluation of the anti-asthmatic, antitussive and expectorant activities of extract and fractions from Elaeagnus pungens leaf. J Ethnopharmacol. 2009; 126: 538-542.
4. Ahmadiani A, Hosseiny J, Semnanian S, et al. Antinociceptive and anti-inflammatory effects of Elaeagnus angustifolia fruit extract. J Ethnopharmacol. 2000; 72, 287-292.
5. Sabina L, Ireneusz K, Michal S, et al. In vitro biological activity of fruits and leaves of Elaeagnus multiflora Thunb. and their isoprenoids and polyphenolics profile. Antioxidant. 2020; 9: 436.
6. Fu YC, Wang XJ, Advances on chemical constituents and pharmacological activities from plants of Elaeagnus L. Qilu Pharm Affairs. 2007; 26: 232-233.
7. Lou FM, Yang J, Bai ZC, et al. Studies on chemical constituents in rhizome of Elaeagnus bockii I. Zhongguo Zhong Yao Za Zhi. 2006; 31: 988-989.
8. Ayaz M, Riaz M, Malik A, et al. Elaeagnoside, chymotrypsin inhibiting steroidal glucoside from Elaeagnus orientalis. Nat Prod Res. 2009; 23: 409-414.
9. Wu YB, Gu Y, Ouyang MA. Water-soluble constituents from the bark of Elaeagnus pungens and their cytotoxic activities. J Asian Nat Prod Res. 2010; 12: 278-285.
10. Li LH, Baek IK, Kim JH, et al. Methanol extract of Elaeagnus glabra, a Korean medicinal plant, inhibits HT1080 tumor cell invasion. Oncol Rep. 2009; 21: 559-563.
11. Chen CY, Chen CT, Yeh HC, et al. Secondary metabolites from the leaves of Elaeagnus glabra. Chem Nat Compd. 2019; 55: 724-725.
12. Edwards RL, Maitland DJ, Pittayakhajonwut P, et al. Metabolites of the higher fungi. Part 33. 1 grammicin, a novel bicyclic C7H6O4 furanopyranol from the fungus Xylaria grammica (mont.) Fr. J Chem Soc Perkin Trans. 2001; 1: 1296-1299.

© 2022 Yang TL, et al. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License