

A new triterpenoid from stem bark *Garcinia lateriflora* Blume

Nuridin Saidi¹, Mustanir^{1*}, Raihanaton², Mohd. Azlan Nafiah³

¹Departement of Chemistry, Faculty of Mathematics and Natural Sciences, Unsyiah University, Banda Aceh, 23111, Indonesia.

²Academy of Pharmaceutical and Food Analysts, Banda Aceh, 23241, Indonesia.

³Departement of Chemistry, Sultan Idris Education University, Malaysia.

Correspondence Author: mustanir_yahya@unsyiah.ac.id

Abstract

Garcinia is one of the plants that can be made as a traditional medicine however very limited research on it. A new triterpenoid named garcinin has been isolated from stem bark *Garcinia lateriflora* Blume. In this research ethyl acetat was using as solvent. Column chromatography is used for the isolate purified compound and their structures determined by extensive one-dimensional- and two-dimensional nuclear magnetic resonance (NMR) experiments.

Keyword : *Garcinia lateriflora* Blume and triterpenoid

INTRODUCTION

Garcinia genus is a tropical plant that belongs to the Clusiaceae family with large species. This plant is widely spread in Indonesia, which is commonly known as mangosteen. This plant contains many phenolic, [1], xanton [2]; [3], flavonoid [4]; [5], terpenoid compounds [6]. These groups have biological and pharmacological activities such as The high phenolic content was observed in the methanol extract of leaf followed by methanol extract of stem and dichloromethane extract of leaf. The *G. lancifolia* fruit juice exhibited high antibacterial activity against *Pseudomonas aeruginosa*, *Escherichia coli*, *Micrococcus luteus*, *Streptococcus mutans*, *Bacillus mycoides* and *Bacillus subtilis* [1]. Based on the research for methanolic, ethyl acetate and n-hexane extract, it can be concluded that the ethyl acetate extract of *G. hombroniana* Pierre as the most active extract for antioxidant and lipoxygenase inhibition activity [7] and *Garcinia Indica* could be useful for preparation of neutraceuticals as potent antioxidant to treat various human diseases and its complications [5]. One of *G. lateriflora* known as mangosteen forest is native to Indonesia, which is found in Sumatera, Java, Kalimantan and Maluku [8]. The active compound of plant *G. lateriflora* can be directly applied. Up to date the studies of properties and biological activity of plants are still limited so it needs to be done further assessment of plants *G. lateriflora*.

RESULTS AND DISCUSSION

Compound D was obtained as white crystals. The IR spectrum of the subfraction D compound showed the medium absorption band at the wave number, μmax 2950 cm^{-1} . This absorption band was corresponded to an aliphatic C-H group. The absorption band of μmax 1670 cm^{-1} was an absorption of C=O [9]. The wave number μmax 1450 cm^{-1} was the absorption band for CH₂ and the absorption band at wave number, μmax : 1390 cm^{-1} was the uptake of C-H bending of the germinal dimethyl. The ¹H NMR spectrum showed seven methyl singlets resonating at δH (ppm) 0.92; 0.93; 1.20; 1.90-1.91; 1.07; 1.05 and δH 0.86 showing protons (H-18, H-19, H-21, H-26, H-27, H-28 and H-29). The proton doublet peak in the down field area was seen at δH (ppm) 5.59-6.00 (*d*, *J* = 9.15); 6.25-6.31 (*dd*, *J* = 11.45) and 7.23-7.25 (*d*, *J* = 11.45) which were proton H-22; H-23 and H-24 respectively. Other cyclic aliphatic protons resonated in the region δH (ppm) 1.04-2.59 which was characteristic of terpenoid group compounds.

Spectrum ¹³C-NMR showed that in subfraction D there were 29 carbon signals. The results of ¹³C-NMR and DEPT analysis showed that there were 7 methyl carbon, 8 methylene carbon, 7 methyl carbon and 7 carbonyl carbon. The methyl carbon resonates at δC (ppm) 12.32 (C-26); δC 15.04 (C-18); δC 16.83 (C-21); δC 18.84 (C-19); δC 19.09 (C-27); δC 21.63 (C-28) dan δC 26,63 (C-29). The DEPT spectrum showed the 8 methylene metals that resonate on δC 22,79 (C-6); δC 23,47 (C-2); δC 28,01 (C-12); δC 28,07 (C-11); δC 29,10 (C-15); δC 30,72 (C-1); δC 33,95 (C-7) and δC 34,59 (C-4). Metin carbon resonates δC 40,77 (C-20); δC 41,00 (C-17); δC 46,40 (C-21); δC 49,86 (C-19); δC 123,58 (C-23); δC 141,33 (C-24) and δC 124,67 (C-25). The DEPT spectrum also showed the quaternary carbon resonates on δC 42,50 (C-20); δC 45,80 (C-17); δC 47,52 (C-21); δC 47,63 (C-19); δC 124,17 (C-23); δC 173,84 (C-16) and δC 217,54 (C-3). The NMR¹³C spectrum revealed two carbon-carbonyl substituents in which there was a chemical shift δC 217, 4; δC 173, 84 ppm. Signal 3 carbon methane for the double bond appeared on a chemical shift δC (ppm) : (123, 58; 124,67 and 141,33). Comparison of ¹³C NMR data of research results and literature data can be seen in Table 1.

Table 1. ¹H NMR (CDCl₃, 500 MHz), ¹³C NMR (CDCl₃, 500 MHz)

Position	Compound D		Structure 3β-hydroxy-Lanosta-9(11),24-dien-26-ic Acid		Friedelin	
	δ _H , ppm (<i>J</i> in Hz)	δ _C (ppm)	δ _H , ppm (<i>J</i> in Hz)	δ _C (ppm)	δ _H , ppm (<i>J</i> in Hz)	δ _C (ppm)
1	2,05 – 2,06	22,79		22,3		
2	1,83	42,5		41,5		
3		217,54		213,2	3,21	
4	2,35 – 2,36	47,6		58,3		
5	-	42,1		42,1		
6	1,55	45,8		41,3		
7	1,21 – 1,23	18,84		18,3		
8	-	47,63		53,2		
9	2,08	33,95		37,5		
10	-	49,86		59,6		
11	1,24			35,7	5,81 (t, <i>J</i> = 7,1)	
12	1,35	29,10		30,5		
13	-	41,00		39,7		
14	-	40,77		38,3		
15	1,83	34,59			1,83	34,0
16	-	173,84				27,9
17	1,57 (m)	47,63				50,7
18	0,92 (s)	16,83		42,9	0,75	18,3
19	0,93 (s)	12,32		35,4	0,82	12,0
20	1,5 (d)	30,72				35,9
21	1,20 (s, <i>J</i> = 9,15)	19,09			1,05	18,0
22	5,95 – 6,00 (d, <i>J</i> = 9,15)	150,07				36,9
23	6,25 – 6,31 (dd, <i>J</i> = 11,45)	123,58				25,7
24	7,23 – 7,25 (d, <i>J</i> = 11,45)	141,33			5,23 (d, <i>J</i> = 5,8)	143,9
25	-	124,67				126,9
26	1,90 – 1,91					170,6
27	1,07 (s)			18,6		15,5
28	1,05 (s)	26,36		32,1	0,99	28,0
29	0,86 (s)				0,89	14,3
		21,36			0,66	21,1

The HMQC spectra indicated a correlation between carbon and proton at H-1/C-1; H-2/C-2; H-4/C-4; H-6/C-6; H-7/C-7; H-9/C-9; H-11/C-11; H-12/C-12; H-14/C-14; H-17/C-17; H-18/C-18; H-19/C-19; H-20/C-20; H-21/C-21; H-22/C-22, H-23/C-23; H-24/C-24; H-26/C-26; H-27/C-27; H-28/C-28 and H-29/C-29.

COSY spectra of D subfraction with respect to chemical shift (δ ppm : 5,9 – 7,4) Indicated a correlation between H-22 (5,59-6,00; *d*, *J*=9,15); with H-23 (6,25-6,31; *dd*, *J*=11,45) and H-23 correlation with H-24 (7,23-7,25; *d*, *J*=11,45).

The HMBC spectrum of D subfraction showed that there was a correlation between proton H-19 correlated with C-1, C-5, C-9 and C-10. Proton on chemical shift δ_H2,08 ppm (H-9) has a correlation with C-10 and C-11. Correlation also occurred in

H-18 correlated with C-12, C-13, C-14 and C-17. Carbons on chemical shifts δ_C (ppm) :41,00 (C-17); 40,77 (C-20); 16,83 (C-21) dan 150,07 (C-22) in correlation with proton H-21. Proton at a chemical shift of δ_H 5,95 - 6,00 ppm (H-22) correlated with C-20 and C-23, then proton H-23 correlated with C-22 and C-24.

Subfraction D analysis based on IR spectroscopy data, ¹³C-NMR, ¹H-NMR, DEPT, MHQC, COSY and HMBC, phytochemical testing and comparing with structurally similar compounds to triterpenoid α-amirin, triterpenoid lupeol [10], friedelin and β-hydroxide-lanostic acid-9 (11), 24-dien-26-olat [11]

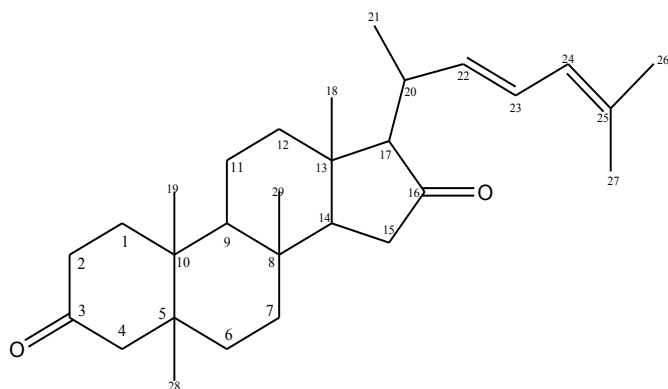


Figure 1. Structures of triterpenoid derived compounds

CONCLUSION

The new compounds of triterpenoid derivatives have been successfully isolated from *G. Lateriflora* stem barks named garcinin. Determination of chemical structure using spectrophotometer: IR, 1D (1H, 13C and DEPT) and 2D (1H - 1H COSY, HMQC and HMBC) NMR.

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