Int. J. Med. Arom. Plants, ISSN 2249 – 4340
Vol. 2, No. 4, pp. 691-693, December 2012

SHORT COMMUNICATION

Antioxidant activities of leaves extracts of three species of *Garcinia*

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Article History: Received 17th September 2012, Revised 25th December 2012, Accepted 26th December 2012.

Abstract: The antioxidant activities of n-hexane, ethyl acetate and methanol extracts of leaves of three *Garcinia* species (viz. *G. humbroniana* Pierre, *G. lateriflora* Blume *var. Javanica* Boerl., *G. kydia* Roxb.) were investigated. The 1,1-diphenyl-2-picryl-hydrazyl (DPPH) assay showed the highest antioxidant activity in the methanol leaves extract of *G. humbroniana* Pierre with IC_{50} value 7.9 µg/mL, methanol leaves extract of *G. lateriflora Blume var. Javanica Boerl* with IC_{50} value 6.18 µg/mL, and the ethyl acetate leaves extract of *G. kydia* Roxb with IC_{50} value 11.6 µg/mL.

Keywords: Antioxidant; *Garcinia* species; DPPH.

Introduction

Antioxidants are radical which acts by donating hydrogen atoms to the radical compounds. Radicals derived from antioxidants such as phenols with a molecular structure are stable chemical species and can stop the chain reaction of oxidation (Frankel 1993). The sources of antioxidants can be synthetic or natural. However, currently the use of synthetic antioxidants began to be restricted because of the research results which made it known that the synthetic antioxidants like BHT (Butylated hydroxy Toluene) turned out to be toxic to animal experiments and are carcinogenic (Takasih and Takayumi 1972). Natural antioxidants protect the body against damage caused by reactive oxygen species, which inhibits the occurrence of the degenerative diseases and is able to inhibit lipid peroxidation in foods. Increased interest for natural antioxidants occurred for several years. Natural antioxidants generally have a hydroxy group in its molecular structure (Tebekeme 2009).

Garcinia species is one of the most important plants that have potential as a source of bioactive chemical compounds. *Garcinia* species are widely used by many people for food and traditional medicine. *Garcinia* is mostly found Xanton, Benzophenone, and Triterpene which is antibacterial, antioxidant, and anticancer. Antioxidant found in these showed higher activity, than with the known antioxidant (Limei et al. 2007). Research conducted investigated antioxidant activity and phytochemical screening from extracts of the following leaves *G. humbroniana* Pierre, *G. lateriflora* Blume var. *Javanica* Boerl and *G. kydia* Roxb.

Materials and methods

Plant materials

The leaves of *Garcinia humbroniana* Pierre, *G. lateriflora* Blume var. Javanica Boerl and *G. kydia* Roxb. were collected in July 2011 from Bogor, Indonesia and identified by Center for Plant Conservation-Bogor Botanical Garden.

Extraction

The dried leaves of *Garcinia* species were powdered and extracted successively with n-hexane, ethyl acetate and methanol by cold maceration then evaporated. Furthermore, in each extract performed phytochemistry test and measurements of antioxidant activity by DPPH radical scavengers method.

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Phytochemical screening

Phytochemistry screening were performed which consists of alkaloid test with Mayer, Dragendorff, and Bouchardat reagens; Flavonoid test with Shinoda and Wilson Töubock reaction; tannin test with gelatin test, gelatin-salt test and test with ferrous (III) chloride; glycoside test with Molish reaction; saponin test with honeycomb froth test; anthraquinone test with Bronträger reaction; terpenoid test with Liebermann-Burchard reagent.

Determination of antioxidant activity

The DPPH radical scavenging activity assay reported by Atiqur, R. et al.was adopted with modification. One mL of various concentrations of extract in methanol was added 1 mL of DPPH 0.1 mM and the mixture was incubated at 37 ^{O}C for 30 minutes. The absorbance was measured at 517 nm. BHT and quercetin were used as positive controls. Inhibition of the DPPH free radical in percent (%) was calculated as:

% inhibition = {[Ab – As] / Ab} x 100

Where, Ab is the absorption of the blank sample (containing all reagents except the sample extract) and As is the absorption of the extract.

Results and Discussion

The phenolic compounds such as flavonoids, tannins are a major group compounds that act as primary antioxidant of free radical scavengers (Polterait 1997). Phytochemical such as glycosides, flavonoids, tannins and alkaloids have hypoglycemic activities (Cherian and Augusti 1995). Saponin, terpenoids, flavonoids, tannins, steroids and alkaloids compounds have anti-inflammatory effect (Akhindele and Adeyemi 2007). Steroids, saponins and triterpenoids indicated the analgesic (Sayyah et al.2004). Saponins had hypocholesterolemic and antidiabetic properties (Rupasinghe et al. 2003).

Phytochemical screening of extracts of n-hexane, ethyl acetate, and methanol of *Garcinia* species were investigated. Results from phytochemical screening are shown in table 1.

Table 1: Phytochemical screening of n-hexane, ethyl acetate and methanol extracts from *Garcinia* species leaves.

SNo	Compounds	*G. humbroniana* Pierre			*G. lateriflora* Blume var. *Javanica* Boerl			*G. kydia* Roxb.		
		n-hexane	ethyl acetate	methanol	n-hexane	ethyl acetate	methanol	n-hexane	Ethyl acetate	methanol
1.	Alkaloids	-	+	+	-	+	+	-	+	+
2.	Flavonoid	-	+	+	-	+	+	-	+	+
3.	Steroids/ Terpenoids	+	+	+	+	-	-	+	+	-
4.	Tannins	-	-	+	-	+	+	-	-	+
5.	Anthraquinone	-	-	+	-	+	+	-	-	+
6.	Saponin	-	+	+	-	-	+	-	-	+

Key: +: present; -: absent**.**

Table 2: The antioxidant activity of each extract from *Garcinia* species leaves.

Garcinia Species	Extract	IC_{50} (µg/ml)
Standards	Quersetin	2.4
	BHT	5.5
	n-Hexane	121.4
Garcinia humbroniana	Ethyl acetate	43.7
Pierre	Methanol	7.9
Garcinia lateriflora Blume	n-Heksane	156.8
var. *Javanica* Boerl	Ethyl acetate	8.03
	Methanol	6.18
Garcinia kydia Roxb.	n-Heksane	46.6
	Ethyl acetate	11.6
	Methanol	12.8

The DPPH antioxidant assay provides information on the reactivity of the test compounds with a stable free radical (Singh et al. 2011). The DPPH gives a strong absorption band at 517 nm. The antioxidant activity extracts of *Garcinia* species is shown in the following table:

As in shown Table 2, the DPPH free radical scavenging ability of the extract from leaves of *G. humbroniana* Pierre, *G. lateriflora* Blume var. *Javanica* Boerl, *G. kydia* Roxb are follows: methanol extract > ethyl acetate extract > n-

hexane extract. Further screening is needed to identify the bioactive compound responsible for antioxidant activities.

Conclusions

The results showed the highest antioxidant activity shown by the methanol extract of leaves *G. humbroniana* Pierre had IC_{50} 7.9 µg/mL, methanol extract of leaves *G. lateriflora* Blume var. had IC_{50} 6.18 µg/mL, and the ethyl acetate extract of leaves *G. kydia* Roxb had IC_{50} 11.6 µg/mL.

Acknowledgement: We would like thank to Faculty of Pharmacy, University of Indonesia for supporting this project.

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