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Antioxidant Effect of Some Medicinal Plants from East Kalimantan, Indonesia

Enos Tangke Arung*· Irawan Wijaya Kusuma·Enih Rosamah ·Wiwin Suwinarti·Harlinda Kuspradini ·Jaehong Han**

Wood Chemistry Laboratory, Department of Forest Product Technology, Forestry Faculty, Mulawarman University, Samarinda, East Kalimantan, Indonesia
** Department Systematic Forest and Forest Products Sciences, Agriculture Faculty, Kyushu University, Fukuoka, Japan*
***Department of Biotechnology, College of Industrial Science, Chung-Ang University, Gyeonggi-do, South Korea*

ABSTRACT

In our study to evaluate some medicinal plants from Samarinda (East Kalimantan, Indonesia), we tested nine extracts of plants on radical scavenging activity by using DPPH assay. The KBS (*Syzygium polyanthum*) showed the scavenging activity <25% which similar with Vitamin C and E as a posistive control. DJM (*Anacardium occidentale*), MD (*Phaleria macrocarpa*), JA (*Syzygium aqueum*), DWG (*Hibiscus similis*) were 25-50%, Dek (*Plumbago zeylanica*), BRW (*Tinospora crispa*) were 50-75%, and SN (*Gynura procumbens*), DD (*Gynura segetum*) were >75%. Based on these results, KBS (*Syzygium polyanthum*) showed the highest antioxidant compare with other extracts.

Key words : Medicinal plants, antioxidant, DPPH, screening
Corresponding author : Dr. Enos Tangke Arung, Wood Chemistry Laboratory, Department of Forest Product Technology, Forestry Faculty, Mulawarman University, Samarinda, East Kalimantan, Indonesia.
E-mail : tangkearung@yahoo.com, tangkearung@agr.kyushu-u.ac.jp

1. Introduction

It has been established that oxidative stress is among the major causative factors in induction of many chronic and degenerative diseases including atherosclerosis, ischemic heart disease, ageing, diabetes mellitus, cancer, immunosuppression, neurodegenerative diseases and others[1]. A great number of aromatic, medicinal, spice and other plants contain chemical compounds exhibiting antioxidant properties. Oxidative process is one of the most important routes for producing free radicals in foods, drugs and even in living systems. The most effective path to eliminate and diminish the action of free radicals which cause the oxidative stress is antioxidative defense mechanisms[2] .

Free radicals are chemically unstable atoms or molecules that can cause extensive damage to cells as a result of imbalance between the generation of reactive oxygen species (ROS) and the antioxidant enzymes. Molecular oxygen is an essential component for all living organisms, where it helps in the process of oxidation which is a basic component of aerobic life and of our metabolism. Thus radicals are produced either naturally or by some biological dysfunction[3]. ROS or reactive nitrogen species (RNS) and their excess have a harmful effect, such as the peroxidation of the membrane lipids, aggression to tissue proteins and membranes, on damage to DNA and enzymes. The beneficial effects of antioxidants on promoting health is believed to be achieved through- several possible mechanisms, such as direct reaction with and quenching free radicals, chelation of transition metals, reduction of peroxides, and stimulation of the antioxidative enzyme defense system[4] .

The study done on medicinal plants and vegetables strongly supports the idea that plant constituents with antioxidant activity are capable of exerting protective effects against oxidative stress in biological systems. On continuation of our experimental work for the search of antioxidant activity of medicinal plants, we studied extracts of six medicinal plants. The free radical scavenging activity against 1,1-diphenyl-2-picryl hydrazyl(DPPH) was evaluated during the course of work. The antioxidant activity of vitamin C and E were also determined. The assessment of such properties remains an interesting and useful task, particularly for finding new sources for natural antioxidants.

2. Materials and methods

2.1. Reagents

DMSO was purchased from Wako Pure Chemical Industries, Ltd (Japan). Ethanol was from Sigma (Germany), and DPPH was from Tokyo Chemical Industry (Japan), and other chemicals were of the highest grade commercially available.

2.2. Sample collection

The medicinal plants were collected in Samarinda and Balikpapan, East Kalimantan, Indonesia in July 2007. The plants were identified in Laboratory of Dendrology and the voucher specimens were deposited at Laboratory of Wood Anatomy of Forestry Faculty, Mulawarman University, Indonesia (Table 1).

2.3. Extraction

Plant materials were dried at room temperature and powdered. The dried materials were extracted with ethanol at room temperature for 24 h. The extract solutions were filtered and concentrated *in vacuo*, to obtain the crude ethanol extracts.

2.4. Antioxidant (DPPH radical scavenging) Assay

The sample was first dissolved in DMSO and used for the actual experiment at 30 times dilution. The reaction mixture contained 967 mL of 60 mM DPPH (1, 1−diphenyl−2−picrylhydrazyl) in ethanol and 33 mL of sample solution in DMSO. After the reaction was carried out at room temperature for 20 minutes, the free radical scavenging activity of the sample was quantified by the

Table 1. Species name of samples

No.	Local name	Scientific name	Family	Used part	Location
1	Ki Encok	*Plumbago zeylanica*	lumbaginaceae	leaf	Balikpapan
2	Mahkota Dewa	*Phaleria macrocarpa*	Thymeliaceae	leaf	Balikpapan
3	Daun Dewa	*Gynura segetum*	Asteraceae	leaf	Balikpapan
4	Jambu Air	*Syzygium aqueum*	Myrtaceae	leaf	Balikpapan
5	Brotowali	*Tinospora crispa*	*Menispermaceae*	stem	Balikpapan
6	Waru gunung	*Hibiscus similis*	Malvaceae	leaf	Samarinda
7	Jambu Monyet	*Anacardium occidentale*	Anacardiaceae	leaf	Samarinda
8	Kayu Salam	*Syzygium polyanthum*	Lauraceae	bark	Balikpapan
9	Sambung Nyawa	*Gynura procumbens*	*Asteraceae*	leaf	Balikpapan

decolorization of DPPH at 514 nm[5]. a-Tocopherol and Vitamin C used as a positive control.

3. Results and discussion

Recent study, we investigated the antioxidant activity from nine extracts of Indonesian medicinal plant by using DPPH method. The results in Figure 1, showed that the activity of radical scavenging (DPPH) based the order were Vit C, Vit E and KBS (*Syzygium polyanthum*) at <25%, DJM (*Anacardium occidentale*), MD (*Phaleria macrocarpa*), JA (*Syzygium aqueum*), DWG (*Hibiscus similis*) at 25-50%, Dek (*Plumbago zeylanica*), BRW (*Tinospora crispa*) at 50-75%, and SN (*Gynura procumbens*), DD (*Gynura segetum*) at >75%. Based on these results, KBS (*Syzygium polyanthum*) showed the highest antioxidant compare with other extracts. To the best our knowledge, this is the first report on KBS (*Syzygium polyanthum*) plant in its biological activity as well as DWG (*Hibiscus similis*). For the next, some investigations are needed to isolate the active compounds in active extracts.

It was reported that Dek (*Plumbago zeylanica*) extract has function as antioxidant and anti cancer[6,7], MD (*Phaleria macrocarpa*) as anticancer[8], DD (*Gynura segetum*) caused hepatic veno-occlusive disease[9], JA (*Syzygium aqueum*) as antioxidant[10], BRW (*Tinospora crispa*) as antioxidant and antidiabetic[11,12], DJM (*Anacardium occidentale*) as anti gastric damage, tyrisonase and melanin inhibition[13,14], SN (*Gynura procumbens*) as antihyper-tensive and antiinflammatory[15], respectively.

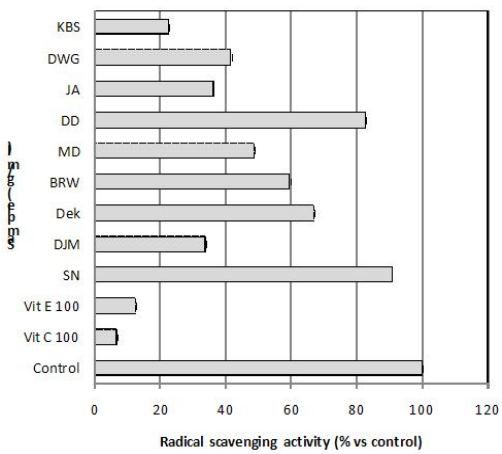

Figure 1. DPPH radical scavenging activity of medicinal plant extracts [Vit C 100 = vitamin C at 100 mg/ml, Vit E 100 = vitamin E at 100 mg/ml, SN = *Gynura procumbens* at 100 mg/ml, DJM = *Anacardium occidentale* at 100 mg/ml, Dek = *Plumbago zeylanica* at 100 mg/ml, BRW = *Tinospora crispa* at 100 mg/ml, MD = *Phaleria macrocarpa* at 100 mg/ml; DD = *Gynura segetum* at 100 mg/ml, JA = *Syzygium aqueum* at 100 mg/ml, DWG = *Hibiscus similis* at 100 mg/ml, KBS = *Syzygium polyanthum* at 100 mg/ml]

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