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LAMPIRAN

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PENGARUH VARIASI PERLAKUAN (SEGAR DAN SIMPLISIA) RIMPANG KUNYIT (*Curcuma domestica*) TERHADAP AKTIVITAS ANTIOKSIDAN DAN KADAR FENOL TOTAL

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Abstrak

Radikal bebas merupakan molekul yang tidak stabil dan sangat reaktif dan antioksidan dapat menetralkan radikal bebas dengan cara mendonorkan satu atom protonnya sehingga membuat radikal bebas stabil dan tidak reaktif. Antioksidan alami salah satunya terdapat pada tanaman kunyit (*Curcuma domestica*) dari famili *Zingiberizaceae*. Rimpang kunyit mengandung senyawa aktif yang berkhasiat sebagai obat yang disebut kurkuminoid, yang termasuk golongan senyawa fenolik. Tujuan penelitian ini adalah untuk melihat pengaruh perlakuan rimpang kunyit yang telah di ambil bagian tengahnya dibedakan menjadi dua perlakuan yakni dalam keadaan segar (P1) dan dibuat menjadi simplisia (P2) terhadap nilai aktivitas antioksidan dan kadar total fenol. Pada penetapan kadar total fenol menggunakan metode *folin ciocalteau* dengan asam galat sebagai pembanding dan pada penetapan aktivitas antioksidan menggunakan metode DPPH. Hasil penelitian diperoleh nilai IC50 pada P1 dan P2 berturut-turut adalah 193,4367 dan 46,7686 µg/ml dan kadar fenol total berturut-turut sebesar 158,3333 mg/g GAE dan 93,9747 mg/g GAE.

Kata kunci: aktivitas antioksidan, rimpang kunyit, total fenol, *folin ciocalteau*, DPPH

Abstract

Free radicals are unstable and highly reactive molecules and antioxidants can neutralize free radicals by donating one proton atom so that free radicals are stable and not reactive. One of the natural antioxidants is in turmeric (*Curcuma domestica*) from the *Zingiberizaceae* family. Turmeric rhizome contains active compounds which are efficacious as a drug called curcuminoid, which belongs to a group of phenolic compounds. The purpose of this study was to see the effect of turmeric rhizome treatment that had been taken in the middle was divided into two treatments namely in a fresh state (P1) and made into a simplicia (P2) on the value of antioxidant activity and total phenol levels. In the determination of total phenol levels using the method of *folin ciocalteau* with gallic acid as a comparison and the determination of antioxidant activity using the DPPH method. The results obtained by IC50 values in P1 and P2 were 193.4367 and 46.7686 µg / ml and total phenol levels were 158.3333 mg / g GAE and 93.9747 mg / g GAE, respectively

Keywords: antioxidant activity, turmeric rhizome, total phenol, *folin ciocalteau*, DPPH

PENDAHULUAN

Dewasa ini, dunia kedokteran dan kesehatan banyak membahas tentang radikal bebas dan antioksidan. Radikal bebas merupakan salah satu bentuk senyawa oksigen reaktif yang terbentuk di dalam tubuh dengan memiliki elektron yang tidak berpasangan (Winarsi, 2005). Senyawa radikal bebas yang sangat reaktif dapat diikat dengan menggunakan antioksidan dan menghambat reaksi oksidasi.

Antioksidan dapat dibagi dua yaitu antioksidan alami dan sintetik. Antioksidan alami ditemukan pada tanaman dan tumbuh-tumbuhan. Sedangkan antioksidan sintetik dibuat dan disintesis oleh manusia seperti *butylated hydroxytoluen* (BHT), *butylated hydroxyanisol* (BHA), *terbutyl hydroxyquinone* (TBHQ), propil galat dan tokoferol (Purba and Martosupono, 2009). Antioksidan sintetik dibatasi penggunaannya dikarenakan bersifat karsinogenik. Oleh

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Curcuminoid Contents, Antioxidant and Anti-Inflammatory Activities of *Curcuma xanthorrhiza* RoxB. and *Curcuma domestica* Val. Promising Lines From Sukabumi of Indonesia

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ABSTRACT

The main bioactive substances in the rhizomes of *Curcuma xanthorrhiza* and *Curcuma domestica* that have efficacy as antioxidant and anti-inflammatory activities are curcuminoids. In this study, ethanol extracts of *C. xanthorrhiza* and *C. domestica* promising lines from Sukabumi of Indonesia were investigated for the presence of curcuminoids, antioxidant and anti-inflammatory activities. HPLC method was used to determined curcuminoids content. The antioxidant (radical scavenging) potential of the samples was evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical method. While for the anti-inflammatory activity, the *in vitro* cyclooxygenase 2 (COX2) inhibition method was used. The curcuminoid content of *C. xanthorrhiza* and *C. domestica* were 31.27 and 66.32 mg/ g, respectively. IC₅₀ values for DPPH radical scavenging activity were 81.99 and 73.31 µg/ mL, with *C. domestica* having lowest value and most potent than *C. xanthorrhiza*. Percent inhibition values for COX2 inhibitor activity were 74.84 and 67.96 %, with *C. domestica* having the highest value. In this study, the ethanol extracts of *C. domestica* promising line from Sukabumi of Indonesia exhibited most in curcuminoids content, antioxidants properties and anti-inflammatory activity than *C. xanthorrhiza* promising line.

Keywords: Curcuminoid, Antioxidant, Anti-Inflammatory, *Curcuma xanthorrhiza*, *Curcuma domestica*, Promosing line

INTRODUCTION

Curcuma xanthorrhiza Roxb., also know as “temulawak” in Indonesia, and *Curcuma domestica* Val., known in Indonesia as “kunyit”, are a medicinal plant from the family Zingiberaceae distributed in Indonesia. Traditionally, *C. xanthorrhiza* rhizomes have been used to treat stomach diseases, liver disorders, constipation, bloody

diarrhea, dysentery, children’s fevers, hemorrhoids, and skin eruptions (Hwang et al., 2000). Pharmacologically is has been reported that *C. xanthorrhiza* has the antimicrobial (Hwang et al., 2000), anti-metastatic (Choi et al., 2004), anti-cancer (Huang et al., 1998), anti-candidal (Rukayadi et al., 2006), anti-oxidant (Masuda et al., 1992) and hypolipidemic activities (Yasni et al., 1993). The rhizomes of *C.*



Antioxidant Activity of Ethanol Extract of Turmeric Rhizome (*Curcuma domestica* Val), Trengguli Bark (*Cassia fistula* L), and Its Combination with DPPH Method

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Abstract

Turmeric rhizome (*Curcuma domestica* Val) and Trengguli bark (*Cassia fistula* L) contain antioxidant compounds which can be determined by 1,1-Diphenyl-2-Picrylhydrazyl (DPPH) free radical inhibition method. This research was conducted to determine DPPH free radical inhibition by ethanol extract of turmeric rhizome, the ethanol extract of trengguli bark, and a combination of turmeric rhizome extract - trengguli bark extract (1:1.5) with ascorbic acid as a comparison. Identification of secondary metabolite classes is performed by phytochemical screening. Antioxidant activity was performed by inhibition of free radical color of DPPH using UV-Vis spectrophotometry. The study showed IC_{50} value of ascorbic acid, as a comparison, is 3.14 $\mu\text{g/mL}$. While ethanol extract of trengguli bark has the best antioxidant activity with IC_{50} value 10.98 $\mu\text{g/mL}$ compare to combination ethanol extract of turmeric rhizome - trengguli bark (1 :1.5) and ethanol extract of turmeric rhizome with IC_{50} value is 13.70 $\mu\text{g/mL}$ and 41.95 $\mu\text{g/mL}$, respectively.

Keywords: Antioxidant, *Cassia fistula*, *Curcuma domestica*, DPPH Method.

Aktivitas Antioksidan Ekstrak Etanol Rimpang Kunyit (*Curcuma domestica* Val), Ekstrak Etanol Kulit Batang Trengguli (*Cassia fistula* L) dan Kombinasinya dengan metode DPPH

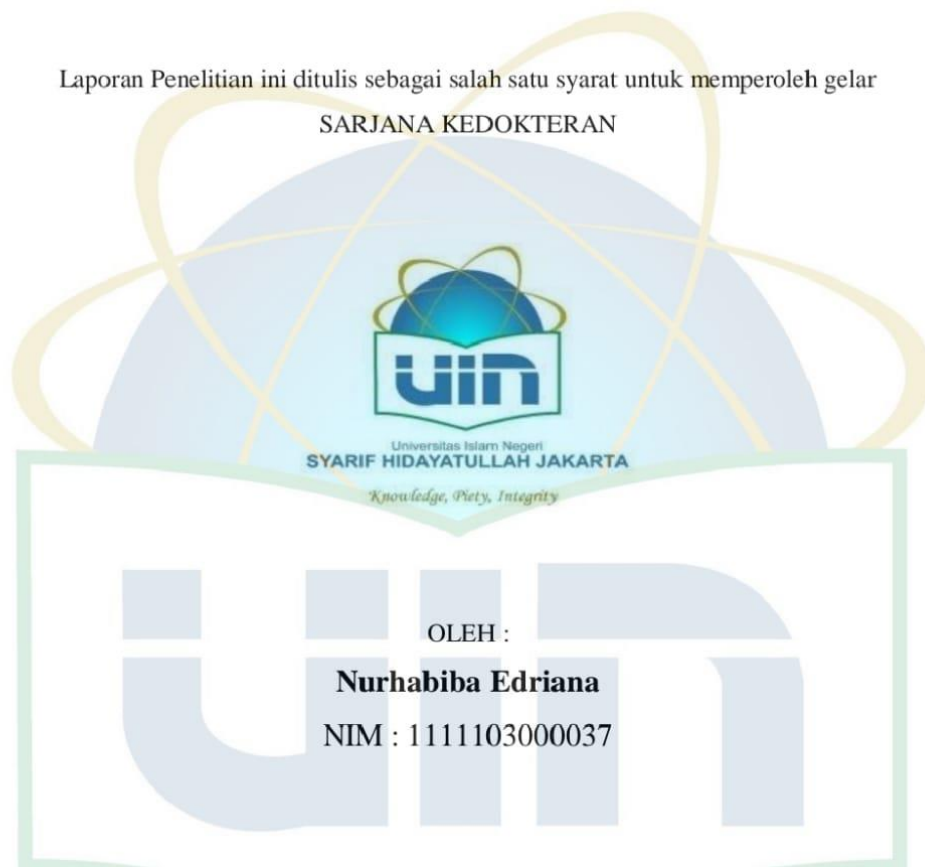
Abstrak

Rimpang Kunyit (*Curcuma domestica* Val) dan Kulit batang trengguli (*Cassia fistula* L) mengandung senyawa yang bersifat antioksidan yang dapat ditentukan dengan metode peredaman radikal bebas 1,1-Difenil-2- pikrilhidrazil (DPPH). Penelitian ini dilakukan untuk mengetahui peredaman radikal bebas DPPH oleh ekstrak etanol rimpang kunyit, ekstrak etanol kulit batang trengguli, kombinasi ekstrak rimpang kunyit – ekstrak kulit batang trengguli (1 : 1.5) dengan asam askorbat sebagai pembanding. Metode skrining fitokimia dilakukan untuk mengidentifikasi metabolit sekunder pada ekstrak. Pengujian aktivitas antioksidan dilakukan dengan metode DPPH yang dianalisa menggunakan spektrofotometri UV-Vis. Penelitian ini menunjukkan nilai IC_{50} asam askorbat, sebagai perbandingan, adalah 3.14 $\mu\text{g/mL}$. Sedangkan ekstrak etanol kulit batang trengguli memiliki aktivitas antioksidan dengan nilai IC_{50} 10.98 $\mu\text{g / mL}$ paling baik daripada kombinasi ekstrak etanol rimpang kunyit – ekstrak etanol kulit batang trengguli (1: 1.5) dan ekstrak etanol rimpang kunyit yang memiliki nilai IC_{50} sebesar 13.70 $\mu\text{g/mL}$ dan 41.95 $\mu\text{g/mL}$.

Kata Kunci: Antioksidan, *Cassia fistula*, *Curcuma domestica*, metode DPPH

**UJI AKTIVITAS ANTIOKSIDAN PADA EKSTRAK
DAUN KUNYIT (*Curcuma domestica val*)
DENGAN MENGGUNAKAN METODE DPPH
(1,1-DIPHENYL-2-PICRYLHYDRAZYL)**

Laporan Penelitian ini ditulis sebagai salah satu syarat untuk memperoleh gelar
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**PENGARUH PEMBERIAN EKSTRAK KUNYIT ASAM
(*CURCUMA DOMESTICA* DAN *TAMARINDUS INDICA*)
DALAM PERIODE GESTASI TERHADAP GAMBARAN
MORFOMETRI FETUS MENCIT BALB/C**

**LAPORAN HASIL
KARYA TULIS ILMIAH**

**Disusun untuk memenuhi sebagian persyaratan
guna mencapai gelar sarjana strata-1 kedokteran umum**

RECCI LABESA

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PROGRAM PENDIDIKAN SARJANA KEDOKTERAN

FAKULTAS KEDOKTERAN

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2016

**PEMANFAATAN DAN EFISIENSI KURKUMIN KUNYIT
(*CURCUMA DOMESTICA VAL*) SEBAGAI INDIKATOR TITRASI ASAM BASA**

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ABSTRACT

The composition of the turmeric plant consists of a root, rhizome, pseudostem, stem leaf, leaves, flower stalks and flowers. Chemical substances contained in turmeric is essential oil, starch, fiber and ash. Turmeric chemical content will be higher if it comes from the lowland compared with turmeric, which comes from the highlands. Curcumin is coloring agent to orange yellow crystalline, insoluble in ether, soluble in oils, alkali maroon, while the bright yellow acid. pH indicator is an organic acid or base having one color if the hydrogen concentration is higher than at a certain price and a color if the concentration was lower. The analysis shows that the optimum extraction temperature is 70 °C, with the extraction time of 120 minutes, the particle size of 100 mesh. Concentration yield is curcumin produced 5.158 mg / L. The cost efficiency of the use of curcumin indicator reached 27,7%.

Keywords : Extraction, Indicators, Acids, Bases, Curcumin.

1. PENDAHULUAN

Dalam perdagangan internasional kunyit termasuk salah satu komoditas ekspor. Kebutuhan kunyit untuk seluruh dunia diperkirakan 12.000 ton per tahun. Di Eropa rimpang kunyit digunakan untuk pewarna makanan berbagai jenis makanan diantaranya keju, mentega dan mustard. Bagian dari kunyit yang paling banyak digunakan adalah bagian rimpang yang dimanfaatkan untuk ramuan obat tradisional, bahan pewarna tekstil dan makanan serta bumbu masakan, rempah-rempah dan bahan kosmetik.

Kunyit termasuk tanaman tahunan yang tumbuhnya merumpun. Susunan dari tanaman kunyit terdiri dari akar, rimpang, batang semu, pelepah daun, daun, tangkai bunga dan kuntum bunga. Rimpang kunyit tumbuh dari umbi utama, yang bentuknya bervariasi antara bulat-panjang, pendek dan tebal lurus ataupun melengkung. Batang tanaman kunyit relatif pendek membentuk tanaman semu dari pelepah daun yang saling menutupi.

Kandungan zat kimia yang terdapat dalam rimpang kunyit adalah minyak atsiri, pati, serat dan abu. Rimpang kunyit kandungan kimianya akan lebih tinggi apabila berasal dari dataran rendah dibandingkan dengan kunyit yang berasal dari dataran tinggi. Seperti pada tabel 1 berikut.

Komponen utama dalam rimpang kunyit adalah *kurkuminoid* dan minyak atsiri. Berdasarkan hasil penelitian Balai Penelitian Tanaman Rempah dan Obat (Balitro) bahwa kandungan kurkumin rimpang kunyit rata-rata 10,92%.

Zat warna kurkumin menurut (Nugroho, 1998) adalah kristal berwarna kuning orange, tidak larut dalam *ether*, larut dalam minyak, dalam alkali berwarna merah kecoklatan, sedangkan dalam asam berwarna kuning muda. Kurkumin memberikan perubahan warna yang jelas dan cepat yaitu kurang dari 5 detik sehingga dimungkinkan sebagai indikator (Muhammad R, 2007).

Research Article

Correlation between Chemical Composition of *Curcuma domestica* and *Curcuma xanthorrhiza* and Their Antioxidant Effect on Human Low-Density Lipoprotein Oxidation

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The antioxidant activity of the curcuminoids of *Curcuma domestica* L. and *C. xanthorrhiza* Roxb. and eight compounds which are prevalent constituents of their rhizome oils were investigated in an effort to correlate human low-density lipoprotein (LDL) antioxidant activity with the effect of the herbs and their components. The antioxidant activity was examined using thiobarbituric acid reactive substances (TBARSs) assay with human LDL as the oxidation substrate. The methanol extracts and rhizome oils of *C. xanthorrhiza* and *C. domestica* showed strong inhibitory activity on copper-mediated oxidation of LDL. Curcumin, demethoxycurcumin, and bisdemethoxycurcumin, isolated from the methanol extracts of both plants, exhibited stronger activity than probucol (IC₅₀ value 0.57 μmol/L) as reference, with IC₅₀ values ranging from 0.15 to 0.33 μmol/L. Xanthorrhizol, the most abundant component (31.9%) of the oil of *C. xanthorrhiza*, showed relatively strong activity with an IC₅₀ value of 1.93 μmol/L. The major components of *C. domestica*, ar-turmerone (45.8%) and zerumbone (3.5%), exhibited IC₅₀ values of 10.18 and 24.90 μmol/L, respectively. The high levels of curcuminoids in the methanol extracts and xanthorrhizol, ar-turmerone and zerumbone in the oils, and in combination with the minor components were responsible for the high LDL antioxidant activity of the herbs.

1. Introduction

Curcuma (Zingiberaceae) is a large genus of rhizomatous herbs distributed in tropical and subtropical regions especially in India, Thailand, the Malay Archipelago, Indochina, and Northern Australia. Many species have been cultivated, and their powdered rhizomes have been widely used as flavours in native dishes and ingredients in many traditional medicines to treat various ailments [1]. The more popular and economically more important species, *C. domestica* L. and *C. xanthorrhiza* Roxb., are more widely used as condiments than for their medicinal purposes. Many phytochemical studies on the extracts and essential oils of several *Curcuma* species, especially *C. longa*, have identified curcuminoids and sesquiterpenoids as the major components

[2–6], and these compounds have been identified as the major groups of antioxidants in the plants [7, 8].

The antioxidant activity of *Curcuma* species, especially *C. longa*, has been measured by various chemical methods such as DPPH radical scavenging activity assay, superoxide anion radical scavenging activity assay, ferric reducing/antioxidant power (FRAP) assay, and metal chelating activity assay [8, 9]. Inhibitory activity of curcumin from *C. longa* and its analogues against free radical initiated peroxidation of human low-density lipoprotein (LDL) [10] and lipid peroxidation and protein oxidation in rat liver mitochondria have been reported [11]. The need to use different methods of antioxidant capacity measurement is due to the various mechanisms of antioxidant action. Determination of the antioxidant activity of plant extracts and compounds often



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1579 - 1582Antiviral Activities of *Curcuma* Genus against Hepatitis C VirusTutik Sri Wahyuni^{a,b,c}, Adita Ayu permatasari^b, Tri Widiandani^c, Achmad Fuad^{a,b}, Aty Widayawaruyanti^{a,b},
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Hepatitis C virus (HCV) infection is one of the major public health problems in the world. Even though the new agents are shown to increase the sustained virology response, however, there are still many people who cannot access the therapy due to the high cost. Moreover, the emergence of resistance and side effects presented the necessity to develop alternative treatment agents for HCV infection. Plants of the genus of curcuma are popular among traditional medicines in the world, including Indonesia. They have been used for many herb remedies and reported to possess many biological activities. Several plants from the curcuma genus were known as treatment agents in liver disease and jaundice. Our current study determines antiviral activities of *Curcuma domestica*, *Curcuma xanthorrhiza*, and *Curcuma heyneana* against HCV and further examines the mechanism of actions. Antiviral activity was performed by *in vitro* culture cells using Huh 7.5it cells and treated with the mixture of extract and virus JFH1. The effects of extracts in HCV life cycle were determined by mode of action analysis to examine the action of substances in the entry or post entry steps. The results revealed that ethanol extract of *C. domestica*, *C. xanthorrhiza*, and *C. heyneana* showed strong anti-HCV activities with IC₅₀ values of 1.68 ± 0.05, 4.93 ± 0.42 and 5.49 ± 0.59 µg/mL, respectively without any cytotoxicity effect. Mode of action analysis demonstrated that of *C. domestica* and *C. heyneana* exhibit HCV in the entry step, while *C. xanthorrhiza* inhibit in the entry and post entry steps of HCV life cycle. Docking analysis to predict the interaction of curcumin, the main compound of curcuma genus, revealed a strong interaction between curcumin and 4GAG receptor, a protein involved in the entry step of HCV infection. Moreover, it was also reported to possess good interaction with 4EAW, an HCV NS5B, which plays an important role in HCV replication. These results suggested that *C. domestica*, *C. xanthorrhiza*, and *C. heyneana* possessed strong inhibition against hepatitis C virus, therefore they may be good candidates for anti-HCV agents.

Keywords: Hepatitis C virus, *Curcuma domestica*, *Curcuma xanthorrhiza*, *Curcuma heyneana*, Curcumin, Docking analysis.

Hepatitis C virus (HCV) infection is still a big issue in the world. It is estimated that 71 million people suffer chronic HCV and approximately 400,000 people die each year due to cirrhosis and hepatocellular carcinoma [1]. Direct acting antivirals (DAAs) are currently used to cure HCV infection. Oral interferon (IFN) free regimen by combination of NS3/NS4A or NS5A inhibitor increased the sustained virology response (SVR). However, the emergence of antiviral drug resistance and the limited patients who can access drugs due to the high cost remain the necessities to find new effective anti-viral agents [2, 3].

Medicinal plants are potential resources to search for new drug candidates. They consist of various chemical substances possessing strong biological activities including anti-HCV activities. Secondary metabolites of plants, such as silymarin, epigallocatechin gallate, naringenin that belong to the flavonoid compounds, have been reported to inhibit HCV [4-6]. Our previous study reported anti-HCV activity of Indonesian medicinal plants and obtained active anti-HCV extract of *Toona sureni*, *Melicope latifolia*, *Melanolepis mutiglandulosa* and *Ficus fistulosa* with IC₅₀ value 3.5-15.0 µg/mL [7]. In another study we evaluated *Ruta angustifolia* leaves and further isolated anti-HCV compounds, chalepin, a coumarin compound and pseudane IX, an alkaloid compound which mediated a strong anti-HCV activity [8]. Exploration of natural sources to search for anti-HCV activity still remained a big chance.

Curcuma domestica, *Curcuma xanthorrhiza* and *Curcuma heyneana* belong to the Zingiberaceae family. Plants of the genus of curcuma are popular in many areas in the world for several kinds of diseases including their use in traditional herbs [9]. In Indonesia, it has been used for many ingredients of *Jamu*, the traditional medicine of Indonesia [10]. *C. domestica* or *C. longa*, also called turmeric have been used for infection, dermatologic diseases and depression in India and China. Recently, it also shows anti-oxidant, anti-inflammatory, anti-cancer and antibacterial activities [11-13]. *C. xanthorrhiza* is locally known as temulawak in Indonesia. The isolated compound from the fresh rhizome, xanthorrhizol, possesses antimicrobial activities against pathogenic bacteria and fungi [14-16]. It has been reported to have hepatoprotective activities, reduced the fatty liver symptom and inhibit alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) and protein content [10, 15]. *C. heyneana* contain oxycurcumenol epoxide, curcumenol and isocurcumenol that have cytotoxicity activity against T-acute lymphoblastic leukemia cells (CEM-SS) with IC₅₀ values of 11.9, 12.6 and 13.3 µg mL⁻¹, respectively [17]. Furthermore, its isolation compounds, heyneanone A, heyneanone C, 4,10-epizedoarandiol, procurcumenol, aerugidiol, zerumin A, and (E)-15,16-bisnorlabda-8,11-dien-13-one inhibited protein tyrosine phosphatase 1B (PTP1B) with IC₅₀ values of 42.5, 35.2, 35.1, 45.6, 35.7, 10.4, and 14.7 µM, respectively [18]. Since it has been reported to have many bioactivities, however, there is no report yet for anti-HCV activity.

Review on *in vitro* antioxidant activities of Curcuma species commonly used as herbal components in Indonesia

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Abstract

Free radicals, reactive nitrogen species (RNS) and reactive oxygen species (ROS) have been known to contribute several degenerative diseases such as cardiovascular diseases, aging, certain types of cancers, rheumatoid arthritis, neurodegenerative, and diabetes mellitus. In order to overcome the negative effects of these radicals, some scientists have explored some natural antioxidants from plants and its by-products. The antioxidant can be defined as any substances or samples capable of inhibiting free radical reactions in the oxidation reaction. Due to curcuminoids contained, Curcuma species such as *Curcuma longa*, *Curcuma heyneana*, *Curcuma mangga*, and *Curcuma xanthorrhiza* were commonly used for herbal components in some traditional medicine. Several *in vitro* tests been introduced and used to measure antioxidant activities, namely radical scavenging assay using 2,2'-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS^{•+}), ferric reducing antioxidant power (FRAP), ferric-thiocyanate, phosphomolybdenum method, cupric ion reducing antioxidant capacity, metal chelating power, beta-carotene bleaching linoleic-ferric-thiocyanate, and thiobarbituric acid methods. This review highlighted the antioxidant activities *in vitro* of *C. longa*, *C. heyneana*, *C. mangga*, and *C. xanthorrhiza* through several tests. To perform this review, several reputed databases were analyzed and used. From this review, it can be stated that Curcuma species have powerful antioxidant activities, therefore they could be potential sources of natural antioxidants and can be used as food supplements.

1. Introduction

Oxidative stress has been defined as the imbalance between the occurrence of reactive oxygen species (ROS) and reactive nitrogen species (RNS) and the endogenous antioxidants present in human body (Persson *et al.*, 2014). When ROS/RNS interacts with various components in the human body, it forms free radicals or compounds capable of producing free radicals. Because free radicals have an unpaired electron, they are highly reactive and unstable. Free radical can react with some biological components (lipids, proteins, and DNA) which resulted in the formation of a new free radical (Lichtenberg and Pinchuk, 2015). The disadvantage

effects of oxidative stress in the human body have become a serious issue. Under oxidative stress condition, the human bodies produce more ROS/RNS such as hydroxyl radicals, nitric oxide radicals, hydrogen peroxide and superoxide anion radicals than endogenous antioxidants either enzymatic antioxidants (e.g., catalase, superoxide dismutase, glutathione peroxidase (GPx), and non-enzymatic ones (e.g., vitamin C, vitamin E, carotenoids, glutathione, and flavonoids) (Pisoschi and Pop, 2015). The imbalance between ROS/RNS and antioxidants leads to the cell damage (Lefer and Granger, 2000; Bhatia *et al.*, 2003; Uttara *et al.*, 2009) and health associated problems (Uchida, 2000; Steer *et al.*, 2002).

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ACTIVITIES TEST OF "JAMU GENDONG KUNYIT ASAM" (*Curcuma domestica* Val. ; *Tamarindus indica* L.) AS AN ANTIDIABETIC IN STREPTOZOTOCIN-INDUCED RATS

UJI AKTIVITAS JAMU GENDONG KUNYIT ASAM (*Curcuma domestica* Val.; *Tamarindus indica* L.) SEBAGAI ANTIDIABETES PADA TIKUS YANG DIINDUKSI STREPTOZOTOCIN

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ABSTRACT

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia. "Jamu gendong kunyit asam" (Curcuma domestica Val.; Tamarindus indica L.) is a traditional medicine that has antioxidant activity which can contribute to diabetic because of the phenolic content. This aim of this study is to determine the effect of "jamu gendong kunyit asam" on lowering blood glucose levels and repairing damage of the islet cells. 25 male wistar rats (Rattus norvegicus) were divided into five groups. Group I as a normal group without any treatment, group II, III, IV and V were induced with streptozotocin (7mg/ 200gBB) then treated with CMC 1%, glibenclamide (0.27mg / 200gBB), "jamu gendong kunyit asam" 1.90mL/ 200gBB and 3.80mL/ 200gBB. The treatment was done for 28 days. Glucometer was used to measure the glucose blood level on day 4, 8, 12, 16, 20, 24 and 28. The damages on the islet cells were examined under the microscope on the histology sample of pancreas prepared with Hematoxylin eosin stain. Datas were analyzed statistically with One Way Anova test, T-Test, and the Kruskal-Wallis test using SPSS 17.0 for Windows. Results showed there is a significant difference ($p > 0.05$) in blood glucose levels and damage to the islets of Langerhans of the pancreas between the glibenclamide group and treatment of "jamu gendong kunyit asam". From the research it can be concluded that the "jamu gendong kunyit asam" have antidiabetic activity which is showed by a decrease in blood glucose levels and an improvement of pancreatic islets of Langerhans in streptozotocin-induced diabetic rats with an effective dose of 1.90mL/ 200gBB.

Keywords: Diabetes, streptozotocin, "jamu gendong kunyit asam", blood glucose, pancreatic histology

ABSTRAK

Diabetes mellitus merupakan suatu kondisi gangguan metabolisme yang ditandai dengan hiperglikemia. Jamu gendong kunyit asam merupakan obat tradisional yang memiliki aktivitas antioksidan yang berkontribusi pada diabetes karena mengandung senyawa fenolik. Penelitian ini bertujuan untuk mengetahui pengaruh jamu gendong kunyit asam terhadap kadar glukosa darah dan perbaikan kerusakan pulau Langerhans pankreas. Sebanyak 25 tikus (Rattus norvegicus) wistar jantan dibagi kedalam lima kelompok. Kelompok I adalah kelompok normal tanpa diberi perlakuan, kelompok II, III, IV dan V adalah kelompok yang diinduksi dengan streptozotocin (7mg/ 200gBB) kemudian diberikan perlakuan masing-masing CMC 1%, glibenklamid (0,27 mg/ 200gBB), jamu gendong kunyit asam dengan dosis 1,90mL/ 200gBB dan 3,80mL/ 200gBB. Perlakuan dilakukan selama 28 hari. Pengukuran kadar glukosa darah dilakukan pada hari ke 4, 8, 12, 16, 20, 24 dan 28 dengan metode enzimatik menggunakan glukometer. Perhitungan persen kerusakan pulau Langerhans dilakukan dengan membuat preparat pankreas menggunakan pengecatan dengan Hematoksin Eosin (HE). Pengamatan preparat dilakukan dengan mikroskop cahaya. Data yang diperoleh dianalisis secara statistik dengan uji One Way Anova, uji T-Test, dan uji Kruskal Wallis menggunakan SPSS 17.0 for Windows. Hasil uji statistik kadar glukosa darah dan kerusakan pulau Langerhans pankreas antara kelompok glibenklamid dan perlakuan jamu gendong kunyit asam menunjukkan perbedaan yang signifikan dengan nilai $p > 0,05$. Dari hasil penelitian dapat disimpulkan bahwa jamu gendong kunyit asam memiliki aktivitas antidiabetes yang ditandai dengan terjadinya penurunan kadar glukosa darah dan terjadi perbaikan pulau Langerhans pankreas pada tikus diabetes yang diinduksi streptozotocin dengan dosis efektif sebesar 1,90mL/ 200gBB.

Kata kunci: Diabetes, streptozotocin, jamu gendong kunyit asam, glukosa darah, histologi pankreas

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**TOKSISITAS BEBERAPA EKSTRAK RIMPANG CABANG TEMULAWAK
(*Curcuma xanthorrhiza* Roxb.) PADA LARVA UDANG (*Artemia salina* Leach)**

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ABSTRAK

Pengujian toksisitas beberapa ekstrak rimpang temulawak hasil ekstraksi dengan metode yang berbeda telah dilakukan terhadap larva udang *Artemia salina* dengan menggunakan *Brine Shrimp Lethality Test* (BSLT). Ekstraksi dilakukan dengan metode maserasi, sokletasi dan refluks. Pelarut yang digunakan untuk ekstraksi adalah etanol 96%. Toksisitas diukur dengan menghitung jumlah larva udang yang mati, kemudian nilai LC₅₀ untuk setiap ekstrak ditentukan dengan menggunakan *Probit Analisis Method*. Hasil penelitian menunjukkan bahwa nilai LC₅₀ ekstrak yang diperoleh dengan metode maserasi, soxhlet dan refluks berturut-turut adalah 14.87 ppm, 19.13 ppm dan 35.92 ppm. Ekstrak rimpang temulawak dengan metode maserasi merupakan ekstrak teraktif. Hasil penapisan fitokimia menunjukkan bahwa dalam ekstrak hasil maserasi tersebut dapat diidentifikasi adanya senyawa golongan alkaloid, flavonoid, steroid, kuinon dan triterpenoid.

Kata kunci : *Curcuma xanthorrhiza* Roxb., toksisitas, *Artemia salina* Leach

PENDAHULUAN

Tumor adalah suatu penyakit sel dengan ciri gangguan atau kegagalan mekanisme pengatur multiplikasi dan fungsi homeostatis lainnya yang terjadi pada organisme multiseluler. Jenis tumor ada 2 macam, yaitu tumor jinak dan tumor ganas. Tumor jinak mempunyai sifat tidak banyak mengganggu organ yang terkena, dan pertumbuhannya sangat lambat atau bahkan tidak menyebar. Tumor ganas mempunyai sifat yang sangat berbeda, karena mempunyai pertumbuhan yang sangat cepat yang menyebabkan gangguan pada fungsi organ yang terkena, selain itu sifat tumor ganas yang sangat ditakuti adalah daya sebar yang sangat cepat. Tumor ganas ini dikenal dengan sebutan kanker, dan penyebab kanker disebut karsinogen (Sidik *et al.*, 1992).

Tahap-tahap penting pembentukan sel kanker adalah inisiasi dengan terjadinya perubahan DNA, promosi yang meliputi perkembangbiakan sel dan perubahan menjadi premalignant, serta tahap progresi

dan invasi (penyusupan ke jaringan sekitar) dan metastesis yaitu penyebaran melalui pembuluh darah dan pembuluh getah bening (Schunack *et al.*, 1990).

Karena banyaknya faktor endogen dan eksogen yang berperan pada timbulnya tumor atau kanker, maka pencegahan ataupun pengobatannya menjadi sesuatu yang cukup kompleks. Beberapa obat yang dinyatakan sebagai antikanker sebenarnya merupakan analog sintetik dari obat-obat yang sudah dikenal efektif. Sebagian diantaranya merupakan bahan alam yang diisolasi dari mikroorganisme atau tumbuhan, serta sebagian lain mewakili upaya dalam rancangan obat yang rasional berdasarkan kemampuannya untuk menghambat kerja enzim atau komponen lain yang esensial untuk pertumbuhan sel tumor. Salah satu bahan alam yang pernah diteliti aktivitasnya untuk aktivitas antitumor adalah temulawak (WHO, 1999).

Temulawak (*Curcuma xanthorrhiza* Roxb.) adalah salah satu tanaman obat yang sering digunakan oleh masyarakat

SKRINING FITOKIMIA TANAMAN OBAT DI KABUPATEN BIMA

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ABSTRAK : Telah dilakukan penelitian tentang skrining fitokimia tanaman obat yang sering digunakan oleh masyarakat Bima sebagai obat tradisional. Beberapa jenis tanaman yang digunakan oleh masyarakat Bima sebagai obat-obatan tradisional diantaranya kunyit, temulawak, jahe, kulit buah delima dan sebagainya. Penelitian ini bertujuan untuk mengetahui kandungan senyawa aktif yang terdapat dalam tanaman obat lokal yang berperan aktif dalam penyembuhan penyakit. Tanaman obat yang dianalisis pada penelitian ini adalah rimpang kunyit (*Curcuma longa* Linn), rimpang jahe (*Zingiber officinale*), rimpang temulawak (*Curcuma xanthorrhiza*), rimpang lengkuas (*Alpinia galanga*), daun jambu biji (*Psidium guajava*), daun sirsak (*Annona muricata* L.), daun sirih (*Piper betle* L.), daun salam (*Syzygium polyanthum*), kulit buah delima (*Punica granatum*) dan daun kecubung (*Datura metel* L). Metode yang digunakan pada penelitian ini merupakan metode penapisan/skrining fitokimia untuk mendeteksi kandungan senyawa metabolit sekunder seperti alkaloid, flavonoid, steroid/terpenoid, saponin dan tanin. Dari hasil skrining fitokimia ekstrak etanol tanaman obat yang telah dianalisis menunjukkan bahwa 10 sampel mengandung flavonoid, 9 sampel mengandung alkaloid, 9 sampel mengandung steroid, 4 sampel mengandung terpenoid, 5 sampel mengandung saponin dan 7 sampel mengandung tanin.

Kata kunci : Skrining fitokimia, tanaman obat, Kabupaten Bima

ABSTRACT : A research on the phytochemical screening of medicinal plants are often used by Bima community as a traditional medicine was been done. Some types of plants used by Bima community as traditional medicines such as turmeric, ginger, pomegranate skin and so on. This study aims to determine the content of active compound contained in local medicinal plants an active compound in the healing of disease. Medicinal plants are analyzed in this study are turmeric, ginger rhizome, rhizome of ginger, galangal rhizome, the leaves of guava, soursop leaves, betel leaves, bay leaves, bark and leaves of pomegranate. The method used in this study is a method of phytochemical screening to detect the content of secondary metabolites, such as alkaloids, flavonoids, steroids/terpenoids, saponins and tannins. The results of phytochemical screening of ethanol extracts of medicinal plants has been analyzed showed that 10 samples contain flavonoids, 9 samples containing alkaloids, 9 samples containing steroid, 4 samples containing terpenoids, 5 samples contained saponins and 7 samples containingtannins.

Key word : phytochemical screening, medicinal plants, Bima region

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**Curcuminoid Contents, Antioxidant and Anti-Inflammatory Activities of
Curcuma xanthorrhiza RoxB. and *Curcuma domestica* Val. Promising Lines
From Sukabumi of Indonesia**

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ABSTRACT

The main bioactive substances in the rhizomes of *Curcuma xanthorrhiza* and *Curcuma domestica* that have efficacy as antioxidant and anti-inflammatory activities are curcuminoids. In this study, ethanol extracts of *C. xanthorrhiza* and *C. domestica* promising lines from Sukabumi of Indonesia were investigated for the presence of curcuminoids, antioxidant and anti-inflammatory activities. HPLC method was used to determined curcuminoids content. The antioxidant (radical scavenging) potential of the samples was evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical method. While for the anti-inflammatory activity, the *in vitro* cyclooxygenase 2 (COX2) inhibition method was used. The curcuminoid content of *C. xanthorrhiza* and *C. domestica* were 31.27 and 66.32 mg/ g, respectively. IC₅₀ values for DPPH radical scavenging activity were 81.99 and 73.31 µg/ mL, with *C. domestica* having lowest value and most potent than *C. xanthorrhiza*. Percent inhibition values for COX2 inhibitor activity were 74.84 and 67.96 %, with *C. domestica* having the highest value. In this study, the ethanol extracts of *C. domestica* promising line from Sukabumi of Indonesia exhibited most in curcuminoids content, antioxidants properties and anti-inflammatory activity than *C. xanthorrhiza* promising line.

Keywords: Curcuminoid, Antioxidant, Anti-Inflammatory, *Curcuma xanthorrhiza*, *Curcuma domestica*, Promosing line

INTRODUCTION

Curcuma xanthorrhiza Roxb., also know as “temulawak” in Indonesia, and *Curcuma domestica* Val., known in Indonesia as “kunyit”, are a medicinal plant from the family Zingiberaceae distributed in Indonesia. Traditionally, *C. xanthorrhiza* rhizomes have been used to treat stomach diseases, liver disorders, constipation, bloody

diarrhea, dysentery, children’s fevers, hemorrhoids, and skin eruptions (Hwang et al., 2000). Pharmacologically is has been reported that *C. xanthorrhiza* has the antimicrobial (Hwang et al., 2000), anti-metastatic (Choi et al., 2004), anti-cancer (Huang et al., 1998), anti-candidal (Rukayadi et al., 2006), anti-oxidant (Masuda et al., 1992) and hypolipidemic activities (Yasni et al., 1993). The rhizomes of *C.*

**STABILITAS SIFAT ANTIOKSIDATIF EKSTRAK TEMULAWAK
(*Curcuma xanthorrhiza* Roxb) TERHADAP PERUBAHAN SUHU**

**STABILITY OF ANTIOXIDATIVE PROPERTIES TEMULAWAK EXTRACTS
(*Curcuma xanthorrhiza* Roxb) ON TEMPERATURE CHANGE**

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ABSTRACT

Thermal process is an important food preservation method in the food industry. The thermal process requires time and the temperature must be appropriate to reach the level of lethal microactivity to ensure public health security. Ginger is known to have antioxidant content. Natural antioxidants are sensitive to heat temperatures. Therefore, before being applied into food, the stability of the heating temperature is necessary.

The experimental design used a randomized block design (RBD), one factor (temperature) with 5 treatments and 3 replications. The temperature treatments are 35oC, 90oC, 100oC, 110oC and 120oC. Variables observed included Total Phenolic, Antioxidant (DPPH) and Curcumin. The data obtained were analyzed for variances and if there were differences between treatments then tested further with the Duncan Multiple Region Test (DMRT) at the level of 5%.

The total phenolic of curcuma extract in the P4 treatment had the highest total phenolic content of 38.81%. The highest antioxidant content in the curcuma extract, which was 54.97% with a concentration of 200ppm. In the antioxidant activity of temulawak extract, the extracted IC50 value was found in P4 treatment, which was 187.37 ppm. The content of curcumin in temulawak extract is found in P4 treatment, which is 30695.99 ppm.

Keywords : Temulawak Extract, Stability, Antioxidant, Temperature, Total Phenolic, Curcumin

ABSTRAK

Proses termal merupakan metode pengawetan pangan penting dalam industri pangan. Proses termal membutuhkan waktu dan suhu proses yang harus tepat untuk mencapai tingkat inaktivasi mikroba (letal) untuk menjamin keamanan kesehatan publik. Temulawak diketahui memiliki kandungan antioksidan. Antioksidan alami bersifat sensitif terhadap suhu pemanasan, oleh karena itu



Antioxidant Potential of Temulawak (*Curcuma xanthorrhiza roxb*)

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Abstract: Temulawak (*Curcuma xanthorrhiza roxb*) is a medicinal plant of the *Zingiberaceae* family. It grows in Indonesia and is used as a raw material for Indonesian traditional medicine. Temulawak is known to have many benefits, including being a potential antioxidant. The active component that is responsible for antioxidant activity in temulawak is curcumin. This study aims to analyze the potential of temulawak rhizome as an antioxidant. The raw materials used were obtained from temulawak rhizome farmers in Purworejo, Central Java. Extraction was performed using the liquid-liquid extraction method developed by PT Javaplant. Proximate analysis was performed and the antioxidant properties and curcumin level were measured. The antioxidant properties were measured using the DPPH method, whereas curcumin levels were measured using HPLC. The data obtained were processed and analyzed using SPSS and presented in the descriptive form. The curcumin and yield contents of the sample were 27.19 and 1.02%, respectively. The antioxidant capacity of temulawak (IC₅₀) was 87.01 ppm. The Temulawak extract exhibited antioxidant activity that was classified as active and is therefore considered to be a good natural antioxidant.

Key words: Temulawak, *Curcuma xanthorrhiza*, curcumin level, antioxidant

INTRODUCTION

Background: Temulawak (*Curcuma xanthorrhiza roxb.*) is one of the *Zingiberaceae* family medicinal plants that is grown in Indonesia and used as a raw material in Indonesian traditional medicine (Sidik *et al.*, 1992; Prana, 2008). Empirically, the temulawak plant is widely used as a single drug or in combination with other drugs. There are more than 50 traditional medical formulations that contain temulawak (Achmad *et al.*, 2007). Temulawak has long been recognized as a medicinal plant, particularly among Javanese populations. Temulawak rhizome is the predominant material used to make traditional medicine.

Temulawak is known for its health benefits as well as its ability to maintain health and prevent disease. As a medicine or a traditional medicine material, Temulawak represents a beacon of hope for the development of Indonesian traditional medicine as a phytotherapy preparation and its utility and safety have been previously reported (Sidik *et al.*, 1992).

As a medicine or a traditional medicine, temulawak will be a new hope for developing traditional medicine in Indonesia as a form of phytotherapy preparation for which its usage and safety have been previously reported (Sidik *et al.*, 1992).

Efficacy tests of temulawak rhizome have been previously reported in empirical *in vitro* studies, pre-clinical trials on animal models and a human clinical

trial (BPOM, 2004). Empirically, temulawak rhizome has been reported to exhibit several health benefits, particularly as a potential antioxidant (WHO, 1999). The active components responsible for the antioxidant activity in temulawak rhizomes are curcumin, bisdemethoxycurcumin and demethoxycurcumin (Masuda *et al.*, 1992). Previous studies have shown that temulawak rhizome exhibits antioxidant activity. The study by Jitoe *et al.* (1992) indicates that the antioxidant activity of temulawak extract is greater than the activity of three types of curcuminoid that can be individually derived from temulawak. Thus, it is conceivable that another substance in addition to those curcuminoids might contribute the antioxidant activity found in temulawak extract. A study by Rao (1995) showed that the antioxidant activity in curcumin is higher than that of vitamin E and beta-carotene. This is because the free radical-scavenging antioxidant activity of curcumin cannot be separated from its structure. Curcumin structure consists of a phenolic hydroxyl group and a beta-diketone group. The phenolic hydroxyl group serves as free radical scavenger within the first phase of the antioxidant process. The chemical structure of curcumin contains with two phenolic groups; each curcumin molecule can scavenge two free radical molecules. The beta-diketone group serves as free radical scavenger during the next phase. Therefore, this study aims to describe antioxidant activity of curcumin in temulawak (*Curcuma xanthorrhiza roxb.*) extract.

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Uji Aktivitas Antioksidan Kombinasi Ekstrak Etanol Rimpang Temu Giring (*Curcuma Heyneana*) dan Daun Pugun Tanah (*Curanga Fel-Terrae*) Menggunakan Metode Diphenyl Picrylhydrazil (DPPH)

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Abstrak

Pugun tanah (*Curanga fel-terrae*) merupakan salah satu jenis tumbuhan yang diketahui memiliki banyak khasiat dan telah digunakan secara empiris oleh masyarakat Kabupaten Karo. Temu giring merupakan salah satu dari sekian banyak tanaman obat yang tumbuh di Indonesia. Telah dilakukan beberapa penelitian tentang khasiat temu giring yaitu sebagai immunodulator, aktivitas fagositosis dan penurunan kadar kolesterol darah. Tujuan penelitian ini adalah untuk mengetahui aktivitas antioksidan kombinasi ekstrak etanol daun pugun tanah dan rimpang temu giring. Serbuk simplisia daun pugun tanah dan rimpang temu giring diekstraksi dengan cara maserasi menggunakan pelarut etanol 96%. Masing-masing ekstrak dan kombinasi ekstrak diuji aktivitas antioksidan terhadap DPPH sebagai radikal bebas dengan mengukur absorbansi DPPH pada panjang gelombang 516 nm pada menit ke-35. Hasil pengujian aktivitas antioksidan dengan metode DPPH menunjukkan bahwa ekstrak etanol daun pugun tanah tunggal, rimpang temu giring tunggal, beserta kombinasinya (1:1, 1:2 dan 2:1) memiliki aktivitas antioksidan dengan nilai *Inhibitory Concentration* (IC₅₀) sebesar 54,01, 102,15, 75,27, 94,85 dan 71,49 μg/mL serta tingkat interaksi kombinasi yang dihasilkan adalah aditif, aditif dan antagonis menengah dengan nilai *Combination Index* sebesar 1,09, 1,03 dan 1,21. Kesimpulan yang diperoleh dari hasil pengujian antioksidan menunjukkan bahwa ekstrak etanol rimpang temu giring dan daun pugun tanah memiliki aktivitas antioksidan yang kuat, tetapi kurang efektif bila kedua ekstrak dikombinasikan..

Keywords: uji aktivitas antioksidan; *Curanga fel-terrae*, *Curcuma heyneana*; DPPH

1. Pendahuluan

Dalam kehidupan sehari-hari, kita tidak dapat terbebas dari senyawa radikal bebas. Asap rokok, makanan yang digoreng, dibakar, paparan sinar matahari berlebih, asap kendaraan bermotor, obat-obat tertentu, racun dan polusi udara merupakan beberapa sumber pembentuk senyawa radikal bebas [1]. Radikal bebas berperan penting dari beberapa patofisiologi berbagai penyakit seperti penyakit hati, iskemia, kanker dan berbagai penyakit kronis lainnya [2]. Selain itu radikal bebas juga diketahui sebagai salah satu penyebab kerusakan dan kematian sel dengan cara berikatan dengan elektron molekul sel [2]. Sebagai upaya untuk melindungi diri dari radikal, tubuh menghasilkan senyawa antioksidan endogen tetapi bila jumlah radikal bebas melebihi jumlah antioksidan dalam tubuh, kelebihanannya akan menyerang komponen lipid, protein ataupun DNA [3]. Pertahanan dari dalam tubuh seringkali berkurang akibat pengaruh lingkungan dan pola hidup yang buruk. Pada kondisi ini manusia membutuhkan senyawa antioksidan yang diperoleh dari luar tubuh seperti buah dan sayur yang pada umumnya mengandung nutrisi dan senyawa yang mampu berperan sebagai antioksidan [4,1].

**UJI AKTIVITAS ANTIOKSIDAN KOMBINASI EKSTRAK
ETANOL RIMPANG TEMU GIRING (*Curcuma heyneana*) DAN
DAUN PUGUN TANOAH (*Curanga fel-terrae*) MENGGUNAKAN
METODE *DIPHENYL PICRYLHYDRAZIL* (DPPH)**

SKRIPSI

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**PROGRAM STUDI SARJANA FARMASI
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Aktivitas Antioksidan Sari Rimpang Temu Giring (*Curcuma heyneana*) Terfermentasi *Lactobacillus bulgaricus*

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Abstrak

Temu giring (*Curcuma heyneana*) telah lama digunakan oleh masyarakat Indonesia terutama untuk menjaga kesehatan kulit. Temu giring mengandung flavonoid dan fenolik yang dapat dimanfaatkan sebagai antioksidan. Fermentasi pada sari temu giring dilakukan agar senyawa kompleks dipecah menjadi senyawa yang lebih sederhana. Penelitian ini bertujuan untuk mengetahui adanya aktivitas antioksidan sari rimpang temu giring terfermentasi *Lactobacillus bulgaricus*. Tahap penelitian ini meliputi pembuatan sari rimpang temu giring, fermentasi, identifikasi fitokimia dan pengujian aktivitas antioksidan dengan metode spektrofotometri menggunakan reagen DPPH. Pembuatan sari temu giring dilakukan menggunakan air, selanjutnya difermentasi dengan bakteri *Lactobacillus bulgaricus* selama 24 jam pada suhu 37°C. Pengujian organoleptis yang dilakukan meliputi warna, bau, rasa serta dilakukan juga uji pH. Hasil identifikasi fitokimia sari temu giring segar dan terfermentasi positif mengandung fenolik dan flavonoid. Sari rimpang temu giring terfermentasi menunjukkan aktivitas antioksidan dengan nilai IC_{50} sebesar 3,49 ppm, sehingga dapat disimpulkan bahwa sari rimpang temu giring terfermentasi memiliki aktivitas antioksidan yang tergolong sangat kuat.

Kata-kata kunci: antioksidan, fermentasi, temu giring

Abstract

Temu Giring (Curcuma heyneana) has been used traditionally to maintain skin health. It contains flavonoid and phenolic compound that can be used as antioxidant. Yet, fermentation is required to breakdown complex compound to be simple. This research aims to observe antioxidant activity of Lactobacillus bulgaricus-fermented temu giring rhizome extract. The steps include preparation of temu giring rhizome extract, fermentation process, phytochemical identification dan antioxidant activity assay using spectrophotometry method with DPPH reagent. Temu giring rhizome was extracted using water, then fermented by Lactobacillus bulgaricus for 24 hours at 37°C. Organoleptic test was conducted include color, odor, and taste. Besides, pH test was also conducted. Phytochemical identification results show that phenolic and flavonoid are present in the fresh and fermented temu giring rhizome extracts. The fermented temu giring rhizome extract demonstrates antioxidant activity with IC_{50} value 3.49 ppm, so it can be concluded that it has very strong antioxidant activity.

Keywords: antioxidant, fermentation, temu giring

PENDAHULUAN

Temugiring merupakan suatu tanaman yang bermarga *Curcuma* yang banyak terdapat di daerah tropis termasuk di Indonesia umumnya hidup di daerah yang lembab dan mudah dibudidayakan. Rimpang temu giring mengandung minyak atsiri 0,8-3%, amilum, damar, lemak, tanin dan zat pahit, zat warna kuning, saponin, dan flavonoid (Setiawan dkk., 1999; Gunawan dkk., 1989 dalam Widyansih, 2011). Menurut Kusumawati *et al.* (2018), bagian rimpang temu giring telah digunakan secara tradisional untuk perawatan kulit, kosmetik dan

kesegaran tubuh oleh para wanita di Jawa dan Bali. Rimpang temu giring memiliki berbagai bioaktivitas sebagai antioksidan, dan antiinflamasi. Rimpang temu giring mengandung antioksidan yang berpotensi sebagai antiaging, sehingga menunjukkan bahwa rimpang temu giring dapat digunakan sebagai kandidat obat antiaging atau sebagai fitokosmetik.

Antioksidan merupakan senyawa yang berperan sebagai agen pereduksi, pengkelat logam, peredam oksigen singlet dan donor hidrogen (Mathew & Abraham, 2006; Miller & Rice-

TEMUGIRING (*Curcuma heyneana*) : AN ANTIOXIDANT IN PUPUR DINGIN AS A TRADITIONAL SUNSCREEN FROM BORNEO

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Abstract

Cosmetic product are currently dominated from the processed chemicals product, whereas Indonesia very rich with natural resources to efficacious with medicinal plants as raw material for cosmetics. One alternative to maximize the utilization of natural materials as a maximizing the main ingredient of cosmetics manufacturing to its use. One of it is pupur dingin, a traditional sunscreen of Borneo. This research is specifically to discuss about the antioxidant activity of rhizomes temugiring, used everyday as one of the nutritious ingredients in pupur dingin. Based on the methods that have been conducted to determine the antioxidant activity of curcumin in rhizome, temugiring can be used with FTC method and DPPH methods. The results of comparative studies of curcumin activity with ascorbic acid using FTC and DPPH have differences. The results of the FTC method, antioxidant effect of curcumin is greater than ascorbic acid or citric acid, but by using the DPPH, antioxidant activity of ascorbic is greater than temugiring rhizomes. Difference in results is by using DPPH method, curcumin from temugiring be solcletated first and then took into the crystal. The FTC method used for measuring the absorbance of the extract. If compared between the extract snd crystal curcumin, the effectiveness of crystal is larger because only contain curcumin without other compounds, where the compared compound is ascorbic acid. The results showed that the antioxidant activity of curcumin in rhizome temugiring is greater than ascorbic acid. Absorbance values ?? at a concentration of 400 ppm are 0.008 for ascorbic acid and 0.005 for the curcumin temugiring indicating that the antioxidant activity temugiring is greater than ascorbic acid. So temugiring as one of the active ingredient found in cold powder can be used as a sunscreen with its curcumin.

Keywords : pupur dingin, temugiring rhizome, curcumine, FTC method, DPPH Method

**Aktivitas Antioksidan Ekstrak Bubuk Kunyit
(*Curcuma domestica* Val.)**

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ABSTRACT

This study aims to find out the effect of the concentration of solution and drying temperature in the process of turmeric extraction and to find out the same for producing extract with optimal *rendemen* and antioxidant activity. The experiment used completely random design and the factorial pattern with the first factor being the solution concentration which consisted of 6 levels, that is, in the concentration of 0%, 30%, 50%, 70%, and 90%. The second factor was the drying temperature which consisted of three levels, they are: 40°C, 50°C, and 60°C with two time repetition. In the examination of the antioxidant activity of turmeric extract, the following tests were done: total phenol (Julkunen-Tito method), the ability of capturing free radical diphenylpicridhidrazil (DPPH), ferry thiosianat method (FTC), and thobarbituric acid method (TBA). The results showed that the concentration of solution and drying temperature affects all parameters under observation, except for the *rendemen* that is not affected by solution concentration, and there was interaction of treatment in all the parameters observed. Test of FTC and TBA showed that there was antioxidant activity in the turmeric extract where it was able to inhibit the formation of peroxide and malonaldehyde in the oxidization reaction of fatty acid. The turmeric extract with the optimal antioxidant activity was obtained at the treatment of concentration 50% at the temperature of 60°C with the *rendemen* value of 7.92%, the total amount of phenol 2.82% and the value of DPPH of 1.13%.

Kata Kunci : *Curcuma domestica* Val., antioxidant, radical scavenging, extraction, temperature

PENDAHULUAN

Kunyit mengandung senyawa kimia yaitu minyak atsiri dan kurkuminoid yang mengandung senyawa kurkumin dan turunannya. Hasil penelitian Balai Penelitian Tanaman Rempah dan Obat (Balitro) menyatakan bahwa kandungan kurkumin rimpang kunyit rata-rata 10,92 % (Rukmana, 1994). Senyawa-senyawa kurkuminoid tersebut diketahui mempunyai potensi sebagai antioksidan, anti-inflammatory, anti kanker, anti mutagen, hipokolesterolemik dan untuk penyembuhan penyakit hepatitis (Safitriani, 2005). Kurkumin sangat disukai oleh industri-industri yang berbahan baku rempah-rempah yang dimanfaatkan pada

industri makanan, industri tekstil, industri farmasi dan obat-obatan (Purseglove *et al.*, 1981 dalam Widyastuti, 1995). Sifat-sifat minyak *curcumin* merupakan bahan antioksidan dan anti bakteri (Rismunandar, 1996). Senyawa antioksidan dari bahan-bahan alami mendapat perhatian sangat besar, disebabkan karena antioksidan alami lebih aman dalam penggunaan. Berbeda dengan senyawa antioksidan sintetik apabila digunakan dalam waktu yang lama dan dalam dosis tinggi dapat menyebabkan mutagenetik dan karsinogenetik. Antioksidan alami dapat diperoleh diantaranya dari rempah-rempah (Hall, 2001). Antioksidan alami telah banyak diteliti dan terbukti mempunyai kemampuan antioksidan yang