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Antioxidant Activity of Pagoda Flower (*Clerodendrum paniculatum* L.) Ethanol Extract using Visible Spectrophotometric Method

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Abstract. Pagoda flower is one of the plant species included in the genus of Clerodendrum which has a number of different species of 580 species, and is spread evenly in Asia, Africa, America, and Australia. A number of species of this genus have been used in traditional medicine in Asia and Africa, India, China, Korea, Thailand and Japan. The antioxidant activity of this plant is known to be very strong, so in this article the antioxidant activity of the flower part of the *Clerodendrum paniculatum* L. species is described. The ability of antioxidant activity was measured by the DPPH method (1,1-diphenyl-2-picrylhydrazyl) which was measured using a Visible spectrophotometer using Vit C as a comparison. The results showed that the ethanol extract of pagoda flowers had antioxidant activity with an IC_{50} value of 64.889 ppm (strong). The Vit C as comparison had IC_{50} value of 8.539 ppm (very strong). The pagoda flower ethanol extract had strong antioxidant activity.

Keyword: Antioxidant, *Clerodendrum Paniculatum* L., Visible Spectrophotometric.

Abstrak. *Bunga Pagoda merupakan salah satu spesies tanaman yang termasuk dalam genus Clerodendrum yang memiliki jumlah spesies yang berbeda sejumlah 580 spesies, dan tersebar merata di Asia, Afrika, Amerika, dan Australia. Sejumlah spesies dari genus ini telah digunakan dalam pengobatan tradisional di kawasan Asia dan Afrika. India, China, Korea, Thailand, dan Jepang. Aktivitas antioksidan dari tanaman ini diketahui sangat kuat, sehingga dalam artikel ini akan dipaparkan aktivitas antioksidan yang dimiliki oleh ekstrak etanol bagian bunga dari spesies Clerodendrum paniculatum L. Pengujian aktivitas antioksidan dilakukan dengan metode DPPH (1,1-diphenyl-2-picrylhydrazyl) yang diukur menggunakan spektrofotometer Visibel dengan menggunakan Vit C sebagai pembanding. Hasil penelitian menjukkan bahwa ekstrak etanol bunga pagoda memiliki aktivitas antioksidan dengan nilai IC_{50} sebesar 64,898 ppm (kuat). Pembanding Vit C memiliki nilai IC_{50} sebesar 8,539ppm (sangat kuat). Ekstrak etanol bunga pagoda memiliki aktivitas antioksidan yang kuat.*

Kata Kunci: *Antioksidan, Clerodendrum paniculatum* L., *DPPH, Spektrofotometri Vis.*

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1. Introduction

Antioxidant research has increased in recent years due to being a preliminary test of various chronic diseases. Various studies have found a link between increased oxidative cellular damage originating from an imbalance between free radicals and natural antioxidants in the body, so this is a major factor in various diseases such as cardiovascular, cancer, aging, and others [1], [2].

Pagoda flower (*Clerodendrum paniculatum* L.) is one of the plant species included in the genus Clerodendrum which has a number of different species of 580 species, and is spread evenly in Asia, Africa, America, and Australia. A number of species of this genus have been used in traditional medicine in Asia and Africa, India, China, Korea, Thailand, and Japan are countries that have used several species of this genus in medical practice [3], [4]. The traditional use of pagoda plants including plant roots and leaves is used as an anti-inflammatory, diuretic. The flowers are used as a sedative and stop bleeding [5].

The ability of some species of this genus in counteracting free radicals using the DPPH method is very good, including *C. serratum* [6], [7], *C.infortunatum* [8], *C. Inerme* [9], *C. Viscosum* [10] and *C. phlomidis* [11]. Previous research conducted in 2015-2016 in which the antioxidant and anti-inflammatory activity tests of the pagoda leaf ethanol extract showed that the pagoda leaf ethanol extract had a very strong antioxidant activity (IC50 <50 ppm) namely IC50 = 27.73376 ppm and had anti-inflammatory activity at a dose of 50 mg / kg[3]. Very strong potential for pagoda flower activity was measured in the toxicity test method against shrimp larvae. The ethanol extract of pagoda flowers had a value of LC50 = 49,415 ppm [12].

In this article we will discuss the antioxidant activity of the same plant, but the part of the plant to be used is flowers as a continuation of previous research.

2. Methods

2.1 Research Tools and Chemical Materials

The materials used in this study were distilled water (Brataco), DPPH (Sigma-aldrich), 96% ethanol (Brataco), industrial standard of vitamin C (CSPC Weisheng Pharmaceutical).

The tools used in this study include laboratory glassware (Pyrex), filter paper (Whatman), micropipets (Socorex), Rotary vacum evaporator (Buchi), UV-Vis spectrophotometer (PG Instruments), analytical scales (Radwag) , blender (Miyako).

2.2 Collection of Plant Materials

The sample raw material used in this study was a fresh 10 kg pagoda (*Clerodendrum paniculatum* L) flower obtained from Silimakuta sub-district, Simalungun district, Medan, North Sumatra. The pagoda flowers obtained were then sorted wet with the aim of separating

the leaves from foreign organic material or other plants that were collected at the time of collection of material, soil or other impurities such as insects. The results of the selection of materials were dried using a drying cabinet with a temperature of 40 - 60°C. The dried material is then sorted and ground into a dry powder [13].

2.3 Extraction Method

The extraction was done by maceration, by soaking 500 grams of simplisia powder with 3.5 liters of 96% distilled ethanol. Furthermore, it was left for three days while stirring occasionally then filtered to obtained maceration resultd. The residue obtained was washed using 1.5 liters of 95% ethanol then filtered and the total maceration results were obtained. The maceration results were then collected and concentrated with rotary vacuum evaporator to obtain a thick pagoda flower extract.

2.4 Test of Antioxidant Activity

A total of 100 mg of extract from pagoda flower extract was dissolved in 100 ml of ethanol p.a then shaken and dissolved until homogeneous so that a concentration of 1000 ppm was obtained as the mother solution. DPPH mother liquor is made in a concentration of 100 ppm. The ethanol extract of the pagoda flower was diluted to 90, 60, 48, 24, 12 and 6 ppm mixed with DPPH radical in a concentration of 40 ppm. The mixture of extract and DPPH was allowed to stand for 30 minutes and room temperature. As a comparison control, the same thing was done by making a solution of vitamin C concentrations of 7.2, 6, 4.8, 3.6, 2.4 and 1.2 ppm then mixed with DPPH reaching a concentration of 40 ppm. The absorbance of each sample was measured at a wavelength of 515 nm [14]. Based on the absorbance measurements, the percent inhibition was calculated using the formula:

$$\%\ inhibition\ of\ DPPH = \frac{A^0 - A^1}{A^0} \times 100$$

Information: A^0 : Control Absorbance
A^1 : Sample Absorbance

After the percent inhibition value hd obtained proceed with calculating the IC_{50} value. The analytical method used to obtain IC_{50} values uses Pbit analysis in the SPSS program.

3. Results and Discussions

The ability of antioxidant activity can be seen in the form of absorbance decrease of DPPH due to an increase in the concentration of the active substance mixed. The absorbance and percent reduction of DPPH by the ethanol extract of pagoda flowers (Clerodendrumpaniculatum L) and Vitamin C can be seen in Tables 1 and 2.

Table 1. Data on Absorbance and Percentage of Scaveging from DPPH by Pagoda Flower Ethanol Extract

Sample Concentration (ppm)	Absorbance	Scaveging Percentage
0	1.241	0
90	0.399	67.908
60	0.776	37.586
48	0.834	32.922
24	1.071	13.859
12	1.143	8.068
6	1.218	2.037

Table 2. Data Absorbance and Percentage of Scaveging from DPPH by Vitamin C

Vit C Concentration (ppm)	Absorbance	Scaveging Percentage
0	1.241	0
7.2	0.727	41.418
6	0.845	31.909
4.8	0.859	30.781
3.6	0.906	26.994
2.4	1.054	15.068
1.2	1.160	6.526

The results of the analysis of the IC_{50} value of the pagoda flower extract obtained based on the calculation of the linear regression equation can be seen in table 3.

Table 3. IC_{50} Result Analysis

Sample	Concentration (ppm) (X)	Inhibition Percentage(Y)	IC_{50} (ppm)
Pagoda Flower Ethanol Extract	90	67.908	64.898
	60	37.586	
	48	32.922	
	24	13.859	
	12	8.068	
	6	2.037	
Vit C	7.2	41.418	8.539
	6	31.909	
	4.8	30.781	
	3.6	26.994	
	2.4	15.068	
	1.2	6.526	

The antioxidant activity of the ethanol extract of the pagoda flower is compared with other species of Clerodendrum such as the leaves of *Clerodendrum viscosum* (IC_{50} 64.51 ppm) [10]. The antioxidant of ethyl acetate and chloroform extract of *Clerodendrum formicarum* was greater than 200 ppm, mixture of ethyl acetate and n-hexane 50 ppm, and its flavonoid isolate in 50 ppm vanylic acid [15]. *Clerodendrum inerme* (chloroform extract 550 ppm and ethanol extract 350 ppm) [9]. *Clerodendrum adenophysum* halliewr. 205 ppm [16].

Antioxidant activity of pagoda flower ethanol extract lower than pagoda leaves with IC50 27.73376 ppm [3]. This difference in activity occurs because of bioactive differences both qualitatively and quantitatively in the flowers and leaves. But this needs to be confirmed by analyzing the bioactive content in both parts of the plant. However, the result of flower ethanol extract was still in the strong category of antioxidant activity.

4. Conclusion

The pagoda flower ethanol extract has trong antioxidant activity with IC50 value of 64.898 ppm.

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