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Contents

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Melastomaceae species : A New Potential of Antioxidant Agent

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ABSTRACT

Melastomaceae species such as *Melastoma Malabathricum* and *Dissochaeta Gracilis* are belongs to Melastomataceae family which are found mostly in the tropics and contains biologically active compounds to treat various illness. The purpose of this study was carried out to investigate the presence of phytochemical groups and antioxidant activity of the leaves of *M. malabathricum* and *D. gracilis*. For this study, the plant sample undergoes extraction processes using three difference polarity of solvents which are hexane, ethyl acetate and methanol by cool extraction method. The highest yield percentage is methanol leaves extract for both samples. The phytochemical analysis study also revealed that many secondary metabolites presence inside *M. malabathricum* and *D. gracilis* such as steroids, flavonoids and terpenoids but absence of alkaloids compounds. Meanwhile, both samples have shown the presence of tannins, saponins and phenols compound for ethyl acetate and methanol crude extracts but not in hexane crude extract. The present of flavonoids and phenolic compound showed their potent antioxidant property so they could be the rich source of natural antioxidants. The methanol extract of *D. gracilis* (54.24 µg/mL) significantly lower of DPPH radical scavenging activity IC_{50} which indicate better antioxidant properties as compared to the methanol extract of *M. malabathricum* (111.90 ug/mL). As conclusion, this study discovered that *M. malabathricum* and *D. gracilis* leaves could be assigned as natural antioxidant and its open door for the bioactive compound identification in the field of pharmaceutical research.

KEYWORDS: Melastomaceae, M. Malabathricum, D. Gracilis, Phytochemical analysis, Antioxidant

I. INTRODUCTION

Melastomataceae plants originate in the tropic and subtropics region with a total almost 4500 species in the word [1]. Some of the examples of Melastomataceae species are *Melastoma malabathricum* and *Dissochaeta gracilis* which can be found in the Southeast Asian region, as well as exist in Malaysia. The leaves, shoots, barks, seeds, and roots of these species have been used to treat various illness such as diarrhoea, cuts and wounds, toothache, stomachache and also acts as antinociceptive, anti-inflammatory, wound healing, antidiarrheal, and antioxidant [1]. Melastomataceae species are one of an abundant source of phytochemical compounds. Therefore, the leaves these species of consists various classes of phytochemicals such as phenolics, flavonoids, terpenoids and steroids [2]. The ellagic acid, quercetin, kaempferol and mefloquine which are flavonoids and phenolic compounds found in these species show a various of benefits as an antioxidant, antidiabetic, anti-malarial and anti-coagulant activity [3,4,5]. The main chemical compounds that act as antioxidant are phenolic compounds which have ability to scavenging free radicals. DPPH method is a conventional method in testing the antioxidant activity. Therefore, the present study was aimed to determine the phytochemicals and to evaluate the antioxidant activity from various extracts of *Melastoma*

malabathricum and *Dissochaeta gracilis* leaves. The finding of this study gives more information about phytochemical screening and antioxidant activity for cultivation of Melastomaceae species. Besides that, the result from antioxidant assay may be taken as preliminary step to search for specific all agents for further applications especially for medicinal purposes.

II. METHODS

A. Plant collection and extractions

The leaves of *Melastoma malabathricum and Dissochaeta gracilis* were collected from Kuala Pilah, Negeri Sembilan. The samples were cleaned, air-dried at room temperature for one weeks and ground into fine powder The grounded leaves were successively extracted with n-hexane, ethyl acetate and methanol (1000 mL for each) for 72 hours at room temperature. The extracts were filtered and concentrated under reduced pressure using rotary evaporator. The dried extracts were stored in a refrigerator for further analysis [6].

B. Phytochemical screening

The leaves extracts were subjected to phytochemical screening for the detection of alkaloids, flavonoids, phenols, steroids, tannins, terpenoids and saponins using the standard qualitative procedures [7,8,9].

C. Antioxidant activity

The difference extracts of *M. malabathricum* and *D. gracilis* was evaluated for 2,2-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity. DPPH radical scavenging activity of these leaves were estimated as method described with slightly modification [10]. Ascorbic acid was used as positive control. Crude extracts of *M. malabathricum and D. gracilis* were dissolved with methanol. Each different solvent has different concentration between 7.81 µg/ml to 1000 µg/ml and was added with DPPH. Then, the absorbance was measured at 517 nm by using a Ultraviolet-Visible (UV-Vis) spectrophotometer. The percentage of DPPH scavenging effect was calculated using the following Equation 1:

$$Percentage\ of\ inhibition = \frac{Abs\ of\ blank - Abs\ of\ sample}{Abs\ of\ blank} \times 100 \qquad \text{(Equation 1)}$$

III. RESULTS AND FINDINGS

The crude extract of leave samples was obtained by using maceration extraction method started from non-polar solvent to semi-polar solvent and finally polar solvent. The percentage yields of leave crude extracts were calculated and tabulated as in Table 1. The result show that methanol crude extract of both samples (*M. malabathricum* and *D. gracilis*) which is soaked in polar solvent show the highest percentage yield which are 7.85% and 9.59%, respectively. The highest percentage yield determines that many compound has been extracted out. Thus, in methanol crude extracts, it could have abundant of polar compound in the sample. A study that has been conducted by [11] stated that the highest percentage yield of *M. malabathricum* crude extract was extracted by most polar solvent which is water, ethanol and ethyl acetate.

Table 1. The percentage yields of *M. malabathricum* and *D. gracilis* leaves crude extracts

Leaves crude extracts	***Weight of samples (g)***	***Weight of leave crude extract (g)***	***Yield (%)***
M. malabathricum			
Hexane	83.53	2.07	2.48
Ethyl acetate	80.60	2.58	3.21
Methanol	79.79	6.27	7.85
D. gracilis			
Hexane	150.07	3.07	2.05
Ethyl acetate	148.26	7.26	4.90
Methanol	144.43	13.85	9.59

The results of phytochemical screening of *M. malabathricum* and *D. gracilis* were as shown in Table 2. Preliminary phytochemical profiling reflects information regarding the diversity of different classes of secondary metabolites such as flavonoids, steroids, saponins and tannins in the plant extracts [8].

Table 2. Phytochemical analysis of *M. malabathricum and D. gracilis*

Phytochemical tests	**Leaves crude extract**					
	MMH	**MMEA**	**MMM**	**DGH**	**DGEA**	**DGM**
Steroids	+	+	+	+	+	+
Flavonoids	-	+	+	-	+	+
Tannins	-	+	+	-	+	+
Saponins	-	+	+	-	+	+
Phenols	-	+	+	-	+	+
Terpenoids	+	+	+	+	+	+

Key: MMH - *M. malabathricum* hexane crude extract
MMEA - *M. malabathricum* ethyl acetate crude extract
MMM - *M. malabathricum* methanol crude extract
DGH - *D. gracilis* hexane crude extract
DGEA - *D. gracilis* ethyl acetate crude extract
DGM - *D. gracilis* methanol crude extract
(+) - presence
(-) - absence

This study also confirms the use of organic polar solvent (methanol) and semi polar solvent (ethyl acetate) in the preparation of leaves extract to yield better results as compared to non-polar solvent (n-hexane extracts). It revealed the ethyl acetate and methanol extracts in leaves of *M. malabathricum* and *D. gracilis* are presence the higher group of phytochemical compounds. DPPH scavenging assay was used to determine the antioxidant activities of Melastomaceae sp. Based on the result, methanol crude extract was showed the higher antioxidant activity may due to presence of abundant polar compounds especially phenolic compounds. The IC_{50} values of standard and crude extracts are determined in Table 3.

Table 3. IC_{50} values determined by using DPPH assay

Tests compound	**IC_{50} values (µg/ml)**
MMM	111.90
DGM	54.24
Ascorbic acid	13.02

Graph in Figure 1 show the percentage of radical scavenging activity against the concentration of standard and crude extracts by using linear regressions to calculated IC_{50} values. The IC_{50} value for ascorbic acid show 13.02 µg/ml while methanol crude extract for *M. malabathricum* and *D. gracilis* were 111.90 µg/ml and 54.24 µg/ml, respectively. The antioxidant activity mostly depends on their phytochemical compound and their derivatives. Thus, in this study, it can be concluded that methanol crude extract of *D. gracilis* has better efficiency in antioxidant activity as compared to *M. malabathricum*.

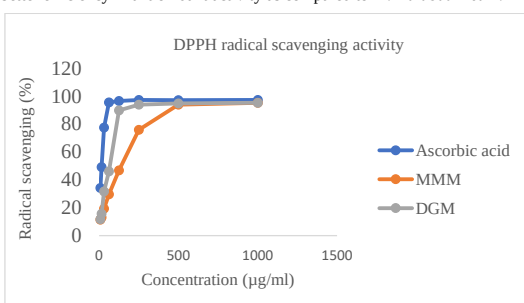

Figure 1. The percentage of radical scavenging activity against the concentration of standard and crude extracts.

IV. CONCLUSIONS

Melastomaceae species have been screened for their chemical constituents and antioxidant properties. The result obtained on the phytochemical analysis of the plant species provides preliminary information of the plant and also suggest the type of phytochemical constituents that may be responsible for the antioxidant activity exhibited by these plant extracts. However, more work needs to be carried out to determine the active compounds responsible for their antioxidant activities and other biological properties in order to enhance biomedical and pharmaceutical fields.

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