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Characterization and Screening of Phytochemical Secondary Metabolite of Seri (*Muntingia calabura,* L) Leaves which is Potential as an Anti-Diabetic based on Indonesian Herbal Medicine Standard

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Abstract

Indonesia has abundant natural resources, especially plants that can be used as raw material for herbal medicine. One of the plants is seri plant (*Muntingia calabura*, L.). The potential plant part in this study is the leaf part. The leaves of *M. calabura* were taken from plants that have produced fruit in fresh conditions, cleaned and dried in an open space protected from direct sunlight. The simplicia was powdered and then quartered, then extracted with ethanol as a solvent. The simplicia powder and extract obtained were screened for phytochemicals using the standard method. The characterization results showed that the simplicia powder and extract met the national standard of quality for Indonesian herbal medicines, both the simplicia powder and the extract contained secondary metabolites, including alkaloids, flavonoids, triterpenoids and steroids, saponins and tannins. The process of preparing and organizing samples from the leaves of this plant met the quality standards of Indonesian national herbal medicine and has the potential to be tested as an anti-diabetic.

Keywords: Seri Leaves, characterization, phytochemical screening, quality standards, and anti-diabetic

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INTRODUCTION

Indonesia has abundant natural resources, especially plants that can be used as raw material for herbal medicine[1]. The use of plant parts that can be used as herbal medicine, including leaves, fruits, flowers, seeds, stems and roots[2,3]. One of the potential plant parts that can be used as raw material for herbal medicine is seri (*Muntingia calabura*, L) leaves. *M. calabura* is a shrub that is found in many countries in Indonesia, especially in the province of North Sumatra[4]. *M. calabura* stores a variety of potential activities that have been tested for activity as antioxidants[5,6], antiproliferative, anticancer[6], antirheumatic, antibacterial[7]. Based on this information, it is important to standardize the quality standards of plants which will be processed into simplisia powders and extracts before testing both in vitro and in vivo as potential herbal medicinal candidates.

MATERIALS AND METHODS

Sample Preparation

The *M. calabura* leaves used in this study were taken from Namorambe Village, Medan Tuntung District, North Sumatera Province, Indonesia. Sample was identified by a botanist at the Herbarium Medanense, University of North Sumatrea (No. 5107/MEDA/2020). *M. calabura* used were from trees that have been fruitful and were in fresh condition. The samples were cleaned in running water, dried in an open room protected from direct sunlight, then pollinated using a blender and obtained *M.calabura* leaves powder of simplicia.

Simplicia Preparation and Extraction Process

500 g of *M. calabura* leaves simplicia powder was extracted with ethanol and soaked for 5 days at room temperature and stirred occasionally and then filtered. The filtering process used Whatman No. 1 paper. Liquid extract obtained by crude ethanol extract in liquid conditions. The ethanol extract was concentrated using a rotary vacuum evavorator at a temperature of 50^{o}C.

Characterization of Simplisia *M. calabura* Leaves Powder

The simplicia characterization that was carried out included macroscopic examination, microscopic examination, determination of water content, determination of total ash content, determination of acid insoluble ash content,

determination of water soluble extract content, and determination of ethanol soluble extract content[1].

Phytochemical Screening of *M. calabura*

Phytochemical fraction screening was carried out for simplicia powder and leaf ethanol extract *M. calabura* leaves with the aim of knowing the secondary metabolite compounds contained in simplicia and the ability of ethanol solvents to filter various groups of secondary metabolites found in simplicia. The phytochemical screening process was carried out using the standard method [8,9, 10].

RESULTS AND DISCUSSION

Macroscopic Examination

Samples (*M. calabura*) leaves were oval in shape, 2.5-15 cm long, 1-6.5 cm wide with serrated leaf edges, pointed tips, and horizontal alternate structures. Light green leaf color with tight hair on the underside of the leaves.

Microscopic Examination

The results of microscopic examination showing that the seri leaves from the microscopic observation contained stomata, parenchyma, trichomes, crystals and vascular tissue.

Simplicia Powder Examination

The results of characterization carried out on simplicia powder of *M. calabura* leaves against various observation parameters were shown in Table 1.

Table 1: Characterization of Seri Simplisia Powder *M. calabura* Leaves

No.	Characterization parameters	Sebuk Simplisia		Evidence
		%	Requirements for MMI edition IV	
1.	Water soluble content	19.68	Not more than 30%	Appropriate
2.	Ethanol soluble content	9.83	Not more than 15%	Appropriate
3.	Total ash content	1.20	Not more than 12%	Appropriate
4.	Acid insoluble ash content	0.49	Not more than 1%	Appropriate
5.	Water content	4.26	Not more than 10%	Appropriate

Based on the results of observations on the simplicia powder sample *M. calabura* leaves in Table 1 it shows that all test parameters on the sample show conformity to the standards found in the Indonesian Medical Materials Book. The determination of these various parameters is important as a mandatory standard for each plant sample designated as medicinal raw material.

Screening for Secondary Metabolites

The weight of *M. calabura* ethanol extract obtained was 6.34 ± 0.006 g. The results of screening for the ethanol extract of *M. calabura* leaves were shown in Table 2.

Table 2: Phytochemical Screening *M. calabura* leaves

Phytochemical Screening	Reagent	Simplicia Powder	Ethanol Extract
Alkaloids	Mayer	+	+
	Dragendroff	+	+
	Wagner	+	+
Flavonoids	Shinoda test	+	+
Triterpenoids and steroids	Libermann Bouchard	+	+
Saponnis	Forth methods	+	+
Tannis	$FeCl_3$ 1%	+	+

Screening results showed that both the crude powder and the ethanol extract from the crude extract contained various secondary metabolites. These results indicate that both the simplicia and the extract have the potential to be tested for their activity as an anti-diabetic in vitro. This information is important in standardizing the simplicity and extracts that will be used in determining the activity as an evaluation of the pharmacological effects it causes. The simplicia and extracts obtained met the standardized quality standards of raw materials to be applied as herbal medicine[11]. Reagents that were used in phytochemical screening use standard reagents in the identification of each class of secondary metabolites.

CONCLUSION

M. calabura leaves in the form of simplicia met the quality standard as a raw material for herbal medicine according to the Indonesian herbal national standard, and the powder of simplicity and ethanol extract has various types of secondary metabolites such as alkaloids, flavonoids, triterpenoids and steroids, saponins, and tannins. This shows the potential that it can be tested as an anti-diabetic both in vitro and in vivo.

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REFERENCES

1. Gurning K, Simanjuntak H.A. Karakterisasi dan Skrining Fitokimia Daun Pirdot (*Saurauia vulcani* Korth.). Eksakta: Jurnal Penelitian dan Pembelajaran MIPA 2020; 5(2):98-105
2. Sibi G, Naveen R, Dhananjaya K, Ravikumar K.R, Mallesha H. Potential Use of *Muntingia calabura* L. Extracts Against Human and Plant Pathogens. Pharmacognosy Journal 2012; 4(34):44-47
3. Maqbool M, Dar M.A, Gani I, Mir S.A, Khan M. Herbal Medicines as An Alternative Source of Therapy: A Review. World Journal of Pharmacy and Pharmaceutical Sciences 2019; 3(2):374-380
4. Gurning K, Sinaga H. In Vitro Anti-Diabetic Potential Extract Test of Seri (*Muntingia calabura*, L.) Leaves. Asian Journal of Pharmaceutical Research and Development 2020; 8(6)
5. Pertiwi R.D, Suwaldi, Martien R, Setyowati E.R. Radical Scavenging Activity and Quercetin Content of *Muntingia calabura* L. Leaves Extracted by Various Ethanol Concentration. Journal Food and Pharmaceutical Sciences 2020; 8(1):174-184
6. Zakaria Z.A, Mohamed M, Mohd N.S, Rofiee M.S, Hussain M.K, Sulaiman M.R, Teh I.K, Salleh M.Z. In Vitro Antiproliferative and Antioxidant Activities of the Extracts of *Muntingia calabura* Leaves. The American Journal of Chinese Medicine 2011; 39(1):183-200
7. Sarimana J, Adnayana I.K, Sukandar E.Y, Kurniati N.F. The Antirheumatic Activity of *Muntingia calabura* L. Leaves Ethanol Extract and Its Fraction. Asian Journal of Pharmaceutical and Clinical Research 2017; 10(1):84-86
8. Gurning, K. Identification of Secondary Metabolic and Test of Activity Ethyl Acetate Fraction of Bangun-Bangun (*Coleus amboinicus* Lour.) Leaves As Antioxidant. Biolink 2020; 7(1):117-122
9. Gul R, Jan S.U, Fardullah S, Sherani S, Jahan N. Preliminary Phytochemical Screening, Quantitative Analysis of Alkaloids, and Antioxidant Activity of Crude Plant Extracts from Ephedra intermedia Indigenous to Balochistan. Hindawi The Scientific World Journal. 2017; 1-7
10. Gurning K, Boangmanalu R, Simanjuntak H.A, Singarimbun N, Rahmiati R, Lestari W. Identification of Sekondari Metabolites and Antidiarrheal Activity of Pirdot Leaves Ethanol Exract (*Saurauia vulcani* Korth) from West Pakpak, North Sumatera Province, Indonesia. Rasayan Journal of Chemistry 2020; 13(4):2385-2389
11. Depkes RI. 2000. Parameter standar umum ekstrak tumbuhan obat. Jakarta: Departemen Kesehatan Republik Indonesia