Borneo Journal of Pharmacy
Vol 3 Issue 2 May 2020
Page 58 – 63

http://journal.umpalangkaraya.ac.id/index.php/bjop/article/view/1267
DOI: https://doi.org/10.33084/bjop.v3i2.1267
e-ISSN: 2621-4814

Pharmacognostic Study of Sangkareho Root (*Callicarpa longifolia* Lam.) from Pelaihari, South Kalimantan

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Keywords:
Callicarpa longifolia Lam
Pharmacognostic
Thin-layer chromatography

Abstract

Sangkareho (*Callicarpa longifolia* Lam.) is used traditionally by one of Kalimantan's indigenous tribes, the Dayak Tunjung tribe as a medicine for colds and inflammation, where the plant parts used are the roots. Considering its very potential prospects, research aimed at providing a scientific basis for plant pharmacognostic data needs to be carried out with qualitative methods. The qualitative examination is done by several methods including test identification of organoleptic, macroscopic, microscopic, and chemical compounds. Organoleptic test results showed that the roots have a light brown color, bitter and slightly spicy, and a rather pungent odor. Microscopic test results showed sangkareho root has a length of ±90 cm; width of ±1 cm; and for the form of a spear with a ride root system. Microscopic observations are found in the form of epidermal cells, exodermis, cortex, endodermis, bearing files, calcium oxalate crystals, and stone cells. The identification of chemical compounds showed positive results against alkaloids, flavonoids, saponins, and triterpenoids. The thin-layer chromatography profile shows four separate stains with eluent ethyl acetate : methanol : water in a ratio of 8 : 2 : 1, respectively.

Received: February 20th 2020
Accepted: April 25th 2020
Published: May 21st 2020

INTRODUCTION

Indonesia is a country that has enormous biodiversity potential. Geographically, Indonesia has many types of plants that can be used traditionally as medicines for various diseases (von Rintelen *et al*., 2017). One of them is the island of Borneo or also known as Kalimantan, which has the potential of traditional medicine knowledge by various tribes and is rich in useful plants (Khoo *et al*., 2016).

Sangkareho (*Callicarpa longifolia* Lam.) is one of the native plants of Borneo which belongs to the genus Callicarpa (Novaryatiin *et al*., 2018; Qamariah *et al*., 2016). This plant contains a source of natural compounds and can be used as traditional medicines (Harley *et al*., 2004). The Callicarpa genus is utilized by one of the indigenous tribes of Kalimantan, the Dayak Tunjung tribe (Setyowati, 2010). *Callicarpa longifolia*, also called "karehau", is traditionally used as a treatment for cold symptoms and inflammation of the roots, while the leaves are useful as a wet powder with analgesic, anti-inflammatory, antimicrobe, and antioxidant activity (Handayani & Natasia, 2018; Erwin *et al*., 2015).

Pharmacognostic studies are the first step in the standardization process of medicines derived from plants (Yuan *et al*., 2016). This research helps identify the nature and characteristics of a plant material. Identification and quality assurance of an ingredient are important prerequisites for ensuring plant quality that will contribute to safety and efficacy (Castillo *et al*., 2020; Ekor, 2013).

According to previous research it was revealed that the leaves of *C. longifolia* with 70% ethanol extract had several secondary metabolite compounds such as flavonoids, tannins, saponins, and terpenoids (Supomo *et al*., 2016; Semiawan *et al*., 2015). However, research on the content of chemical compounds from the roots of *C. longifolia* plants especially those originating from South Kalimantan has never been done before, so researchers are interested in examining the pharmacognostic study of *C. longifolia* by organoleptic, macroscopic, microscopic, identification of groups of chemical compounds, and thin-layer chromatography (TLC). This pharmacognostic study is expected to be able to assist in identifying the content of efficacious compounds especially those found in the roots of the *C. longifolia* plant.

MATERIALS AND METHODS

Plant material

Callicarpa longifolia plant was collected from Pelaihari, South Kalimantan in the month of January 2018. The plant was identified by Laboratory of Pharmacognosy, Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat.

Pharmacognostic study

Coarse root powder of *C. longifolia* is used to study organoleptic, macroscopic, microscopic, phytochemical identification, and TLC profiles of *C. longifolia* ethanol extract (Supomo *et al*., 2016; Wulandari, 2011; Hanani, 2014; Gandjar & Rohman, 2007; Puspadewi *et al*., 2013).

RESULTS AND DISCUSSION

Organoleptic test

Callicarpa longifolia root observed shape, color, taste, and odor based on five respondents' opinions. Organoleptic examination of fresh *C. longifolia* root color was light brown while the root simplicia was brown. Fresh roots and simplicia of *C. longifolia* has a bitter and some bitter taste, the taste is suspected to have an alkaloid and saponin compound as according to Harbone (2006), alkaloids and saponins have a bitter or bitter taste. The smell of fresh roots and simplicia of *C. longifolia* has a distinctive odor that is a rather pungent odor.

Macroscopic characteristics

Macroscopically, the fresh root of *C. longifolia* is the length around ±90 cm; the width of the *C. longifolia* root is around ±1 cm; and for the *C. longifolia* root form it has a spear shape (Tjitrosoepomo, 2005) with a tapering system, as presented in **Figure 1**.

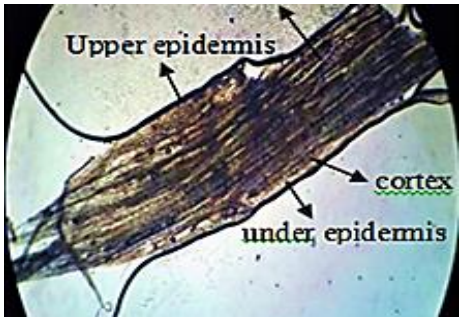
Figure 1. *Callicarpa longifolia* root

Microscopic characteristics

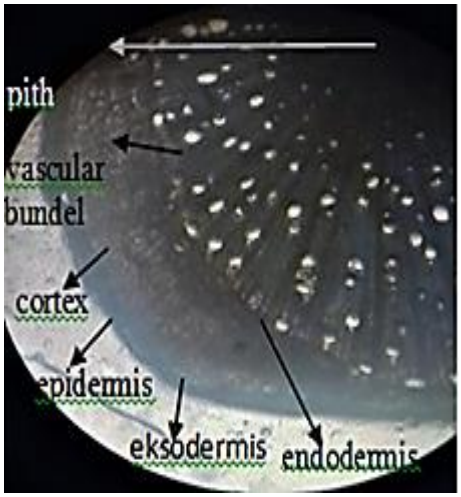
Based on microscopic anatomy at a 10 x 10 magnification including epidermis, exodermis, cortex, endodermis, transport file, and pith, as can be observed in **Figure 2**. At a magnification of 40 x 10 available stone cells and Ca oxalate crystal. In the anatomy of root powder with a magnification of 10 x 10 fibers have the epidermis and exodermis are the outermost part of the root, the epidermis consists of a tightly arranged cell membrane, which does not have space between cells. The function of the epidermis is to protect the underlying tissue (Javelle *et al*., 2011). Endodermis is the layer that separates the cortex with the central cylinder, the function of the endodermis is the part that is inserted by ground water

into the ship. The cortex is composed of several layers of cells, which are close to the epidermal layer (Palmgren, 2018).

At the root of the transport beam system consists of xylem and phloem arranged alternately. The transportation file consists of xylem or a means of transportation used to transport food and nutrient extracts from the soil to the whole body of the plant, and phloem, which is a file that functions as a carrier of photosynthesis from the leaves to the entire body of the plant (Turner & Sieburth, 2003). Pith is located between transport vessels that are in the parenchymal tissue. The function of the pith itself is used to store nutrients for plants, travel nutrients in the stems, branches, leaves and roots of plants. Stone cells (sclereids) is a network of sclerenchyma cells that are relatively round with a thick cell wall, this network serves to strengthen the body of the plant (Whitehill *et al*., 2016).



a



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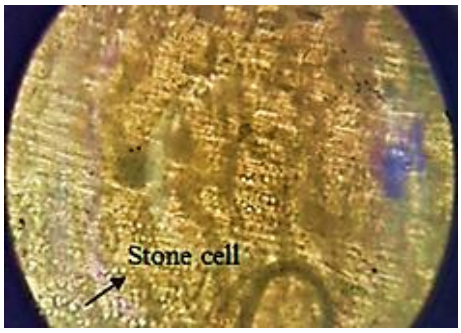
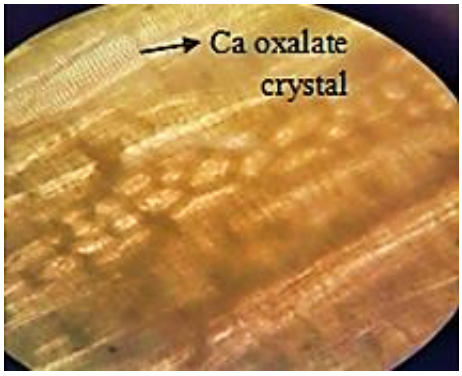


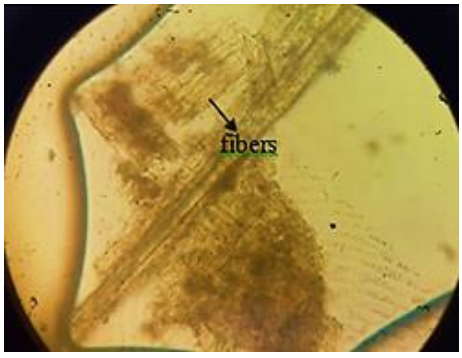
c

Figure 2. Microscopic fresh root of *C. longifolia* with magnitude of 10 x 10 (**a**) and 40 x 10 (**b**) with the appearance of a stone cell (**c**)

Calcium oxalate crystal as can be seen in **Figure 3** is indicated by black dots (Toolakou *et al*., 2016). The function of calcium oxalate crystal is as a protector for plants, because calcium oxalate can react allergically to animals that eat it. Fibers are sclerenkim tissue, consisting of cells that are elongated with thick and pointed-ended cell walls, which function as supporting tissues (Whitehill *et al*., 2016).



a



b

Figure 3. Microscopic powder of *C. longifolia* root with magnitude of 10 x 10 with the appearance of Ca oxalate crystals (**a**) and fibers (**b**)

Phytochemical screening

Phytochemical screening of *C. longifolia* roots showed positive results on the presence of alkaloid, flavonoid, saponin, and triterpenoid compounds. These results are in line with previous studies reported by Ardhany *et al.* (2019) and Saputra (2016).

Thin-layer chromatography profile

Thin-layer chromatography results using ethyl acetate : methanol : water (8 : 2 : 1) eluent provide good stain management and quite clearly separated. On observations using UV_{254} nm obtained three stains with the Rf value of 0.72; 0.61; and 0.54. Observation using UV_{366} nm appeared single white stain with Rf value of 0.54. Observation using H_2SO_4 stain viewer which was then heated in an oven obtained four stains with Rf value of 0.14; 0.54; 0.61; and 0.72. From the results of TLC profiles obtained four spots that showed about samples using eluent ethyl acetate : methanol : water (8 : 2 : 1). For the value of Rf is in accordance with the range, while the value of Rf between 0.2 - 0.8 (Gandjar & Rohman, 2007). The Rf value can be made to prove in identifying the composition. If the value of Rf has the same value, then the composition can be claimed to have the same or similar characteristics. Meanwhile, if the Rf value is different from the complement that can be claimed to represent a different composition (Kartini *et al.*, 2020). Based on the description, seen from the TLC profile and Rf value of 70% ethanol extract of *C. longifolia* root with ethyl acetate eluent : methanol : water (8 : 2 : 1). The eluent optimization is good for improvement, but for development it can be done by increasing the polarity of the eluent mixture used (Zhang *et al.*, 2018). The TLC plate with multiple spotting views is presented in **Figure 4**, while a comparison of the Rf values obtained is presented in **Table I**.

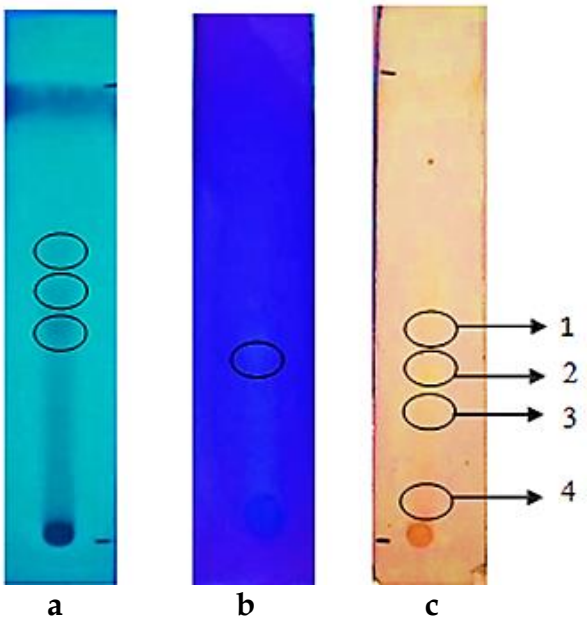


Figure 4. The TLC plate profile with UV_{254} nm (**a**), UV_{366} nm (**b**), and H_2SO_4 (**c**) stain viewer

Table I. The Rf value of TLC results with ethyl acetate : methanol : water (8 : 2 : 1) eluent

Stain Viewer	Spot	Rf	Color
UV_{254} nm	1	0.72	Dark blue
	2	0.61	Dark blue
	3	0.54	Dark blue
UV_{366} nm	1	0.45	White
H_2SO_4	1	0.72	Red
	2	0.61	Yellow
	3	0.54	Dark Yellow
	4	0.14	Dark Yellow

CONCLUSION

Characteristics of *C. longifolia* root there are several examinations consisting of organoleptic examination of *C. longifolia* root has a light brown root color, a bitter taste and a bit bland and a rather pungent characteristic odor. Macroscopic examination of *C. longifolia* root has a length of approximately ±90 cm; width of approximately ±1 cm; and for the shape of the roots of *C. longifolia* is a spear with a tapered root system. In microscopic examination of the identified fragments the cell forms are epidermis, exodermis, cortex, endodermis, transport beam, calcium oxalate crystal, and stone cells. From the results of identification of chemical compounds, the compounds contained in *C. longifolia* root are alkaloids, flavonoids,

saponins, and triterpenoids. The results of the TLC profile showed four stains on the plate using eluent ethyl acetate : methanol : water (8 : 2 : 1).

ACKNOWLEDGMENT

The authors would like to thank Department of Pharmacy Sekolah Tinggi Ilmu Kesehatan Borneo Lestari for providing the support.

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