Pharmacognostic and Antimicrobial Studies of *Garcinia latissima* Miq. Leaves (Clusiaceae)

Neneng Siti Sili Ambarwati, Islamudin Ahmad, Berna Elya, Amarila Malik, Muhamad Hanafi

**ABSTRACT**

*Garcinia latissima* Miq known as Dolo magota (Maluku), is a medicinal plant belonging to the family Clusiaceae. The purpose of the research was to explore the phytoconstituents present, pharmacognostical details, and their antimicrobial efficacy. Methods: The preliminary phytochemical components were qualitatively examined using the standard method systems. The antimicrobial screening was carried out using the grid diffusion method and the minimum inhibitory concentrations (MICs) using dilution method. Results: The phytochemical screening of different extract of *G. latissima* Miq leaves revealed the presence of tannins, sapogenins, and alkaloids and the results were tabulated. The ethyl acetate and methanolic extracts from its leaves showed antimicrobial activity especially for *Bacillus subtilis*, a positive bacteria; the hexane extract did not show any activity against the selected microbair. Conclusion: The results of the phytochemical and bio-efficacy study revealed most valuable information and also support the continued sustainable use of this leaves in the traditional system of medicine.

Key words: *Garcinia Latissima*, Antimicrobial, Phytoconstituent, Pharmacognostical

**INTRODUCTION**

*Garcinia latissima* is one species of Guttiferae family and also called Clusiaceae. Its fruit like *G. mangostana* or mangosteen, *G. parvifolia* or kandis, *G. dulcis* or mandu, and *G. xanthoxylos* are edible, sweet, with no acid. In addition to widely spread in Indonesia, this plant also spread in subtropical regions such as Japan, Korea, and China. Tropical Asian, African, and Polynesian country. This family is known to contain the yellow sap, which is a source of camphor paint and varnish, like *G. mangostana, G. dulcis* (Thailand, India, Sri Lanka), *G. hanburyi* (Thailand), *G. morrilli* (India). The contents of yellow sap are generally contain resins, oils, and sometimes have black or red glands, that contains hypercin or pseudohypercin.

Previously research in Papua New Guinea showed that ethanol extract of it dried stem bark has a zone of inhibition against the bacteria *Bacillus subtilis* and *Staphylococcus aureus*. It also has been found that *G. latissima* Miq. stem bark from the center of the province of Papua New Guinea has four new pyranoxanthones, which are latissaxanthone A, latissaxanthone B, latissaxanthone-C, and latissaxanthone-D. The biological activity of latissaxanthone-C showed that it significantly inhibit the activity of viral antigens, which is the causes of tumor. The data of secondary metabolite of it leaves is limited.

This plant, which is called Dolo magota by the local (Maluku), is found in Seram Maluku and Papua but has been cultivated in the Garden. By the local community in Papua, it has been used as itchy medicine. This research used the one that came from Bogor.

This research has a purpose which is to explore the phytoconstituents present, pharmacognostical details, the biological activities of *G. latissima* Miq. leaves as antimicrobial, making it useful in subsequent drug development.

**MATERIALS AND METHODS**

Plant material: *G. latissima* Miq. leaves were collected and identified from Plant Conservation, Bogor Botanical Gardens, Indonesia. After that it was washed, cut into small pieces, and dried in the oven. Dried material is stored in a sealed container in a cool, dry place.

Macroscopic characteristics

For morphological observations, 15-30 cm long fresh leaves were used. The magnifying lens was used to observed the macromorphological features of the leaf.

Microscopic characteristics

Fresh and dry leaf are examined with microscopy was taken using Nikon Coolpix 4500 camera (4.0 megapixel).

**Extraction processes**

This study uses multilevel maceration extraction methods. Powdered leaves material was extracted by repeated maceration at room temperature using...
various solvents: hexane, ethyl acetate, and methanol in a row. After extraction, the filtrate was evaporated using rotary evaporator. The residue (crude extract) was collected and stored at 4°C before used.

**Phytochemical analysis**

The qualitative phytochemical tests of hexane extract, ethyl acetate extract, methanol extract were carried out to identify different phytoconstituents.

**Antimicrobial activity**

This research has conducted two kinds of examination which are, inhibition zone assay, minimum inhibitory concentration (MIC), and the minimum bactericidal concentration (MBC) assay. The inhibition zone assay using the well diffusion method. Four bacterial strains that were used are, *Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, and *Bacillus subtilis* ATCC 27853, and the two fungal species that were used are, *Candida albicans* and *Trichophyton mentagrophytes*. Microbial stock cultures were cultured in nutrient agar for incubation. The first inhibition zone assay was using 100% extract of *G. latissima* Miq. leaves. From the positive results of the first inhibition, the second inhibition zone assay was conducted using the 25% extract in DMSO (dimethyl sulfoxide) the leaves. The MIC and MBC were determined using the broth dilution method.

The MIC was determined by plating out onto each appropriate agar plate.

**RESULTS**

**Macroscopic characteristics**

Macroscopically, the leaf had a simple composition, it had ovalis shape, margins integer, and the venation patterns of leaf were parallel. It had obtusus apex and base, and thick. The leaves were 15-30 cm in length and 10-20 cm in width. The upper surface was laevis, nitidus, and had dark green color. The lower surface had light or pale green color (Figure 1).

**Micrometric characteristics**

The transverse section of *G. latissima* Miq. leaf showed the presence of upper and lower epidermis that was covered with a single layer of cuticle. The sclerenchyma tissue red because it react to florescin in chloroform acid (Figure 2).

There are diacytis stoma on longitudinal section was analyzed and photomicrographed (Figure 3).

**Powder study:** The powder of the leaves were pale brown in colour. The diagnostic features of powder were tetragonal type of crystals of calcium oxalate (Figure 4).

**Phytochemical analysis**

The average of extracts rendered from the result of multilevel maceration extraction from *G. latissima* Miq. leaves powder with different solvent are shown in Table 1.

The results of phytochemical tests are in the Table 2. Alkaloids were present in the n-hexane extracts and ethyl acetate extracts.

**Antimicrobial activity**

The results of the antimicrobial activities of n-hexane, ethyl acetate and methanolic extracts of *G. latissima* Miq. leaves are tabulated in Table 3. All of the extracts showed the inhibition against the selected pathogens. The zone of inhibition of various extracts of *G. latissima* Miq. was compared with available standard antibiotic disc. The 2% ethyl acetate extract and the 2% methanol extract showed that it only active against *B. subtilis* with the diameter of ethyl acetate extract inhibition zone was 7.68 ± 0.076 mm and the diameter of methanolic extract inhibition zone was 9.9 ± 0.786 mm (Table 4).
The activity of ethyl acetate extract exhibited against B. subtilis (MIC 5,000 ppm, MBC 10,000 ppm) (Table 5). The results of the antibacterial activity showed that the activity of methanol extract exhibited against B. subtilis (MIC 10,000 ppm, MBC 20,000 ppm) (Table 6).

**DISCUSSION**

In the present investigation, the detailed pharmacognostic account of G. latissima Miq. leaf will be helpful for botanical identification of the drug.19

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The examples of other compounds are Phenolic acid, alkaloids, flavonoids, terpenes, terpenoids and naphthoquinone. It is clear that the chemical structure of the antimicrobial agents found in higher plants belong to most commonly encountered classes of higher plant secondary metabolites.

Maceration method is suitable for both initial and bulk extraction. The main disadvantage of maceration is that the process can be quite time-consuming, and also consume large volumes of solvents and can lead to potential loss of metabolites. Some compounds may not be extracted efficiently if they are poorly soluble at room temperature. On the other hand, maceration is least likely to lead to the degradation of thermo labile metabolites. The physicochemical properties of some common solvents used in natural products extraction: polarity index of n-hexane 2.7, polarity index of ethyl acetate 4.4, polarity index of methanol 5.1. The initial choice of the most appropriate solvent is based on selectivity for the substances to be extracted. A selective extraction can also be performed sequentially with solvents of increasing polarity.

The results of the present study revealed most valuable information and also support the sustainable use of Garcinia latissima Miq. leaves in traditional system of medicine. Moreover, a continuous and progressing research is to be conducted to prove the biological ingredients and test...
the safety, efficacy and to determine the types of compounds responsible for the antimicrobial effect of *Garcinia latissima* Miq. The result presented here may explain the traditional use of this plant.

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**CONFLICT OF INTEREST**

None

**ABBREVIATION USED**

MIC: the minimum inhibitory concentration; MBC: the minimum bactericidal concentration; ATCC: The American Type Culture Collection; DMSO: dimethyl sulfoxide; SD: standard deviation.

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