

HEPATOPROTECTIVE EFFECT OF SOME MEDICINAL PLANTS IN INDONESIA – A
REVIEW

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ABSTRACT

The liver is the most vital organ in the body, performing an extensive array of physiological functions. Hepatic damage is a prevalent disease that affects every country, including Indonesia. Given the extreme limitations and ineffectiveness of synthetic drug treatments for liver disease, researchers are conducting ongoing research on various compounds derived from natural ingredients. Scientists have validated a number of indigenous Indonesian medicinal plants, including *Curcuma longa*, *Zingiber officinale*, *Andrographis paniculata*, *Psidium guajava*, *Mangifera indica*, *Aloe vera*, and *Phyllanthus niruri*, to possess hepatoprotective properties via distinct mechanisms. Therefore, this review article is aimed to describe the potential hepatoprotective properties of several indigenous Indonesian medicinal plants.

KEYWORDS: Hepatoprotective, *Curcuma longa*, *Zingiber officinale*, *Andrographis paniculata*, *Psidium guajava*, *Mangifera indica*, *Aloe vera*, *Phyllanthus niruri*.

INTRODUCTION

The liver is a critical organ that regulates numerous physiological processes on a fundamental level; its activities are associated with a variety of vital functions, including secretion, storage, and metabolism. Furthermore, it is worth noting that this organ possesses the capacity to produce beneficial agents and detoxify endogenous (Metabolic waste) and exogenous (Toxic compounds) substances.^[1] Additionally, the liver participates in biochemical processes such as reproduction, growth, nutrient provision, and energy supply. Furthermore, it facilitates vitamin storage, carbohydrate and fat metabolism, and bile secretion.^[2] On account of these multifaceted roles, liver disease remains a significant global public health concern.^[3] Liver disease encompasses impairments in the structure, function, and cellular composition of the liver. Autoimmune diseases (e.g., primary biliary cirrhosis), bacterial, viral, and parasitic infections, chemical substances, and pharmaceuticals, such as antituberculosis drugs and high-dose paracetamol, can trigger such impairments. Toxic compounds include carbon tetrachloride (CCl₄), thioacetamide, dimethylnitrosamine (DMN), D-galactosam, and a few others.^[4-6] Notwithstanding significant progress in contemporary medicine, there is currently no drug that can fully stimulate liver function, provide comprehensive protection for the liver, or facilitate regeneration. of liver

cells.^[7] Furthermore, certain medications may induce adverse effects or side effects.^[8]

The use of medicinal plants for the treatment of various diseases has increased throughout the world because they are considered much safer than synthetic drugs.^[9, 10] Research to obtain new hepatoprotective drugs derived from natural ingredients continues to be carried out, one of which is exploring active compounds from natural ingredients, especially medicinal plants, which have traditionally been used by people to treat liver disease in various countries.^[11,12] The aim is to find new hepatoprotective compounds that have mild side effects with low toxicity, so they do not harm patients.^[13,14] Therefore, this review article is aimed to describe the potential hepatoprotective properties of several indigenous Indonesian medicinal plants.

Curcuma longa

Curcuma longa, a member of the *Zingiberaceae* family, is a medicinal plant. This plant is cultivated extensively throughout Asia, particularly in China and India. *C. longa* is a sterile plant that lacks the ability to produce seeds. This plant attains a height of 3 to 5 feet and produces yellow flowers. Subterranean stems that are dense and fleshy constitute the rhizome.^[15] *C. longa* is a medicinal plant with anti-inflammatory and analgesic properties. The reason for this phenomenon is that this

particular plant is composed of a minimum of three naturally occurring polyphenols called curcuminoids (curcumin, demethoxycurcumin, and bisdemethoxycurcumin).^[16,17] Shapiro *et al.*, reported that thioacetamide-induced rat models exhibited a reduction in liver levels of thiobarbituric acid-reactive substances (TBARS), inhibition of NF κ B and iNOS protein expression, and administration of curcumin-containing by *C. longa* at doses of 200 and 400 mg/kg.^[18]

Zingiber officinale

Zingiber officinale is a spice commonly used for culinary and medicinal purposes for centuries. *Z. officinale* is a medicinal plant belonging to the *Zingiberaceae* family that has long been used for antimicrobial, antidiabetic, nephroprotective, hepatoprotective, anti-inflammatory, anticancer, and immunomodulatory treatment.^[19] Administration of *Z. officinale* at doses of 250 and 500 mg/kg was reported to slow the development of liver fibrosis and prevent the formation of free radicals in a rat model induced by thioacetamide.^[20]

Andrographis paniculata

Andrographis paniculata, known as Sambiloto, is a medicinal plant that is empirically used as a medicine for respiratory diseases, diabetes, cancer, obesity, skin infections, herpes, dysentery, fever, sore throat, urinary tract infections, diarrhea, and to reduce inflammation.^[21] This plant has the main content of andrographolide lactone group compounds (\pm 2.5%) in dried simplicia.^[22] Administration of *A. paniculata* at doses of 100 and 200 mg/kg has been reported to reduce liver enzyme levels such as serum glutamate pyruvate transaminase (SGPT), serum glutamate oxaloacetate transaminase (SGOT), alkaline phosphatase (ALP), bilirubin, and lipid peroxide (LPO) levels, as well as increasing antioxidant levels in liver tissue such as superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), and glutathione peroxidase (GPx) in paracetamol-induced mouse models.^[23]

Psidium guajava

Psidium guajava, usually known as Guava, is a medicinal plant that has been used traditionally for a long time in tropical countries, including Indonesia. *P. guajava* is a plant belonging to the *Myrtaceae* family that can be used as an anti-inflammatory, analgesic, anti-diabetic, anti-hypertensive, anti-microbial, antioxidant, antibacterial, and antitumor drug.^[24-26] Administration of *P. guajava* at doses of 250 and 500 mg/kg for eight weeks was reported to reduce levels of SGPT, SGOT, ALP, and bilirubin in a rat model induced by carbon tetrachloride.^[27]

Mangifera indica

Mangifera indica, also known as mango, is one of the most popular tropical fruits. The content of mangiferin, polyphenols, and glucosyl xanthenes in this plant has effects such as strong antioxidant, anti-lipid peroxidation, immunomodulation, cardiotoxic,

hypotensive, wound healing, anti-degenerative, and antidiabetic activity. Meanwhile, various parts of this plant are often used as dental medicine, antiseptic, astringent, laxative, diuretic, anti-diarrhea, anemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, vaginal discharge, bleeding, and hemorrhoids.^[28] Administration of *M. indica* at doses of 25 and 50 mg/kg for thirty days has been reported to reduce levels of SGPT, SGOT, ALP, bilirubin, and lipid peroxide (LPO) levels, as well as increasing levels of antioxidants in liver tissue such as SOD, CAT, GSH, and GPx in a mouse model induced by mercuric chloride.^[29]

Aloe vera

Aloe vera has long been used as a traditional medicine to speed up wound healing. The benefits associated with *Aloe vera* are attributed to the polysaccharides contained in the gel of its leaves, although there are various indications for its use. Its biological activities include improving wound healing, antifungal, anti-inflammatory, anticancer, and immunomodulatory activities.^[30] Administration of *A. vera* at a dose of 30 mg/kg was reported to increase SOD, CAT, and GPx levels, as well as reduce malondialdehyde (MDA) levels and improve liver histopathological structural changes in a mouse model of ischemia-reperfusion injury.^[31]

Phyllanthus niruri

Phyllanthus niruri is a plant that belongs to the *Phyllanthaceae* family. This plant is reported to contain several secondary metabolite compounds, including alkaloids, flavonoids, benzenoids, coumarins, tannins, triterpenes, lignans, phytallates, miscellaneous compounds, and saponins. *P. niruri* has been known to have anti-inflammatory and antioxidant activity, which has been proven to be effective in protecting liver tissue and liver function.^[32] Administration of *P. niruri* at doses of 25, 50, 100, and 200 mg/kg was reported to reduce levels of the enzymes SGPT, SGOT, ALP, lactate dehydrogenase (LDH), total cholesterol (TC), triglycerides (TG), total bilirubin (TB), glucose, total proteins (TP), urea, and creatinine in a rat model induced by carbon tetrachloride.^[33]

CONCLUSION

Indonesia is home to a diverse array of medicinal plants that possess promising attributes that could be harnessed to formulate alternative therapies for liver disease. Empirical and scientific studies have demonstrated that each of these plants inhibits enzymes that indicate liver damage and increases natural antioxidant levels. The presence of active compounds in these plants, which possess hepatoprotective properties through various mechanisms, renders this impossible to separate. It is hoped that research on medicinal plants can be used to improve treatment for liver disease.

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