



**ANTIDYSLIPIDEMIC ACTIVITY OF SOME MEDICINAL PLANTS FROM
KARAWANG, WEST JAVA, INDONESIA: A REVIEW**

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ABSTRACT

Hyperlipidemia is a secondary metabolic dysregulation related to increased levels of triglycerides, cholesterol, and LDL in the serum, which is a major risk factor for premature cardiovascular disease such as atherosclerosis, hypertension, coronary heart disease, etc. Increased plasma lipid levels, especially total cholesterol, triglycerides, and LDL, along with decreased HDL, are known to cause hyperlipidemia, which is the reason for the initiation and progression of atherosclerosis. Currently, researchers are searching for natural ingredients that have been empirically proven to possess antidyslipidemia effects, in order to identify new antidyslipidemia compound candidates. This is done to replace antidyslipidemia drugs, which currently have many side effects. Several medicinal plants native to Karawang, Indonesia, including *Curcuma longa*, *Aloe vera*, *Andrographis paniculata*, *Guazuma ulmifolia*, *Phaleria macrocarpa*, *Morinda citrifolia*, and *Moringa oleifera*, have been scientifically proven to have antidyslipidemia activity with different mechanisms. Therefore, this review article discusses the potential of several medicinal plants native to Karawang, Indonesia, which have antidyslipidemia effects.

KEYWORDS: Antidyslipidemia, Medicinal plants, *Curcuma longa*, *Aloe vera*, *Andrographis paniculata*, *Guazuma ulmifolia*, *Phaleria macrocarpa*, *Morinda citrifolia*, *Moringa oleifera*.

INTRODUCTION

Hyperlipidemia is a predictor of coronary artery disease (CAD). The prevalence of this disease is quite high and is increasing in both developed and developing countries around the world.^[1] Hyperlipidemia is an important risk factor in the initiation and progression of atherosclerosis. The main manifestations of this disorder include increased plasma concentrations of total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and low concentrations of high-density lipoprotein cholesterol (HDL-C).^[2] Therefore, the main consideration in the therapy of hyperlipidemia and arteriosclerosis is to reduce the increase in blood serum and plasma lipid levels.^[3] Currently available hypolipidemic drugs have been reported to have a number of worrying side effects, including hyperuricemia, muscle damage, impotence, memory loss, peripheral neuropathy, body aches, gynecomastia, skin rashes, and others. In addition, there is also an increased risk of myopathy and rhabdomyolysis, which usually occur when used in combination with other drugs.^[4] Most hypolipidemic drugs can be effective if used for several weeks, but the consequences can worsen side effects such as liver damage.^[5] Therefore, it is necessary

to search for new antihyperlipidemia agents derived from natural ingredients in the form of herbal plants. Compared with conventional medicines, herbal plants provide many advantages, including cost effectiveness, broad cultural acceptance, ease of accessibility, and lower side effects.^[6]

Indonesia is the second-largest country in the world with forest biodiversity, where there are 28,000 plant species, and 2,500 of these species are medicinal plants.^[7, 8] Currently, research to obtain new antidyslipidemia 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 the community to treat dyslipidemia in various regions of Indonesia, especially in Karawang.^[9-11] The aim is to find new antidyslipidemia compounds that have mild side effects with low toxicity so they do not harm patients.^[12, 13] Therefore, this review article discusses the potential of several medicinal plants native to Karawang, Indonesia, which have antidyslipidemia effects.

Curcuma longa

Curcuma longa is a medicinal plant belonging to the *Zingiberaceae* family. People widely cultivate this plant in Asia, particularly in India and China. *C. longa* is a sterile plant and does not produce any seeds. This plant grows 3-5 feet tall, and the flowers are yellow. The rhizome is a thick and fleshy underground stem.^[14] Studies widely report that *C. longa* possesses medicinal properties for controlling inflammation and pain. This effect is because this plant contains at least three natural polyphenols, namely curcumin, demethoxycurcumin, and bisdemethoxycurcumin, which are known as curcuminoids.^[15] Administration of *C. longa* containing curcumin at a dose of 300 mg/kg/day for 12 weeks was reported to reduce serum TC, TG, and LDL-C and increase serum HDL-C in mice induced by a high-fat diet.^[16]

Aloe vera

People have long used *Aloe vera* as a traditional medicine to speed up wound healing. The benefits associated with *A. 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.^[17] Administration of *A. vera* at a dose of 500 mg/kg/day for 4 weeks was reported to reduce serum TC, TG, and LDL-C and increase serum HDL-C in mice induced by streptozotocin (STZ).^[18]

Andrographis paniculata

Andrographis paniculata Nees., known as King of Bitters, 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.^[19] This plant has the main content of andrographolide lactone group compounds (\pm 2.5%) in dried simplicial.^[20] Administration of *A. paniculata* at doses of 434.6 and 1303.8 mg/kg orally, twice a day, was reported to reduce serum TC, TG, and LDL-C in mice fed a high-fructose-fat diet.^[21]

Guazuma ulmifolia

Guazuma ulmifolia is the most useful traditional medicinal plant in Indonesia. This plant is one of the tropical plants that is commonly used as a traditional medicine for weight loss, slimming, and lowering cholesterol in the body. *G. ulmifolia* leaves contain phenolic compounds such as flavonoids and tannins, which play a role in their biological activity.^[22] Sutrisna et al., reported that *G. ulmifolia* administered orally at doses of 250, 500, and 1000 mg/kg/day for 15 days reduced serum TC in mice fed a high-cholesterol diet.^[23]

Phaleria macrocarpa

Phaleria macrocarpa, commonly known as God's Crown, is a medicinal plant native to Indonesia. *P.*

macrocarpa extract has been used for many years in traditional medicine and is also scientifically evaluated. The extract is reported to have a number of valuable medicinal properties, such as anticancer, antidiabetic, antihyperlipidemic, anti-inflammatory, antibacterial, antifungal, antioxidant, and vasorelaxant effects. Meanwhile, constituents that have been isolated from various parts of *P. macrocarpa* include phalerin, gallic acid, icaricide C, magniferin, mahcoside A, dodecanoic acid, palmitic acid, des-acetylflavicordin-A, flavicordin-A, flavicordin-D, flavicordin-A glucoside, ethyl stearate, lignans, alkaloids, and saponins.^[24] Andriani et al., reported that mice fed a high-cholesterol diet experienced a reduction in serum TC and an increase in serum HDL-C after oral administration of *P. macrocarpa* at doses of 0.25 and 0.5 g/kg for 28 days.^[25]

Morinda citrifolia

Morinda citrifolia is a medicinal plant that has been used for centuries by traditional medicine practitioners in Karawang, Indonesia, to cure or prevent various diseases. This plant has been reported to have various pharmacological effects, such as antibacterial, antiviral, antifungal, antitumor, anthelmintic, analgesic, hypotensive, anti-inflammatory, and increasing immunity.^[26] Oral administration of *M. citrifolia* at doses of 300, 500, and 1000 mg/kg/day was reported to reduce serum TC, TG, and LDL-C and increase serum HDL-C in mice given Triton WR 1339 and high fat.^[27]

Moringa oleifera

Moringa oleifera is a plant from the *Moringaceae* family. This plant is widely used as a nutritional herb and contains valuable pharmacological actions such as anti-asthmatic, anti-diabetic, hepatoprotective, anti-inflammatory, anti-fertility, anti-cancer, anti-microbial, antioxidant, cardiovascular, anti-ulcer, central nervous system activity, anti-allergic, wound healing, analgesic, and antipyretic activity. This plant contains a rich source of vitamin A and vitamin C. Various types of active phytoconstituents, such as alkaloids, proteins, quinine, saponins, flavonoids, tannins, steroids, glycosides, and fats, are found in it. Some other constituents are niazinin A, niazinin B, and niazimicin A, niaziminin B.^[28] Oral administration of *M. oleifera* at a dose of 250 mg/kg/day was reported to reduce serum TC and LDL-C and increase serum HDL-C in STZ-induced mice.^[29]

CONCLUSION

Indonesia is a country that has various types of medicinal plants that have potential properties to be developed as alternative medicines for the treatment of dyslipidemia. Empirical and scientific evidence supports the cholesterol-lowering properties of these plants. This cannot be separated from the active compounds contained in these plants, which have antidyslipidemic properties with different working mechanisms. It is hoped that research on medicinal plants can be used to improve the treatment of dyslipidemia and to replace

antidyslipidemia drugs, which currently have many side effects.

REFERENCES

- Sahebkar A, Beccuti G, Simental-Mendoza LE, Nobili V, Bo S. *Nigella sativa* (black seed) effects on plasma lipid concentrations in humans: A systematic review and meta-analysis of randomized placebo-controlled trials. *Pharmacol Res.*, 2016; 106: 37-50.
- Alkandahri MY, Kusumiyati K, Renggana H, Arfania M, Frianto D, Wahyuningsih ES, *et al.* Antihyperlipidemic activity of extract and fractions of *Castanopsis costata* leaves on rats fed with high cholesterol diet. *RASĀYAN J Chem.*, 2022; 15(4): 2350-2358.
- Ghule BV, Ghante MH, Saoji AN, Yeole PG. Antihyperlipidemic effect of the methanolic extract from *Lagenaria siceraria* Stand. fruit in hyperlipidemic rats. *J Ethnopharmacol*, 2009; 124(2): 333-337.
- Bidkar JS, Ghanwat DD, Bhujbal MD, Dama GY. Anti-hyperlipidemic activity of Cucumis melo fruit peel extracts in high cholesterol diet induced hyperlipidemia in rats. *J Complement Integr Med.*, 2012; 9(1): 1-18.
- Carvalho AAS, Lima ÜWP, Valiente RA. Statin and fibrate associated myopathy: study of eight patients. *Arquivos de Neuro-Psiquiatria*, 2004; 62(2a): 257-261.
- Sakthiswary R, Zakaria Z, Das S. Diabetes mellitus: Treatment challenges and the role of some herbal therapies. *Middle-East J Sci Res.*, 2014; 20(7): 786-798.
- Alkandahri MY, Maulana YE, Subarnas A, Kwarteng A, Berbudi A. Antimalarial activity of extract and fractions of *Cayratia trifolia* (L.) Domin. *Int J Pharm Res.*, 2020; 12(1): 1435-1441.
- Alkandahri MY, Sujana D, Hasyim DM, Shafirany MZ, Sulastri L, Arfania M, *et al.* Antidiabetic activity of extract and fractions of *Castanopsis costata* leaves on alloxan-induced diabetic mice. *Pharmacogn J.*, 2021; 13(6): 1589-1593.
- Alkandahri MY, Patala R, Berbudi A, Subarnas A. Antimalarial activity of curcumin and kaempferol using structure based drug design method. *J Adv Pharm Educ Res.*, 2021; 11(4): 86-90.
- Alkandahri MY, Arfania M, Abriyani E, Ridwanuloh D, Farhamzah, Fikayuniar L, *et al.* Evaluation of antioxidant and antipyretic effects of ethanolic extract of cep-cepan leaves (*Castanopsis costata* (Blume) A.DC). *J Adv Pharm Educ Res.*, 2022; 12(3): 107-112.
- Nuraeni E, Alkandahri MY, Tanuwidjaja SM, Fadhilah KN, Kurnia GS, Indah D, *et al.* Ethnopharmacological study of medicinal plants in the Rawamerta Region Karawang, West Java, Indonesia. *Open Access Maced J Med Sci.*, 2022; 10(A): 1560-1564.
- Alkandahri MY, Berbudi A, Utami NV, Subarnas A. Antimalarial Activity of Extract and Fractions of *Castanopsis costata* (Blume) A.DC. *Avicenna J Phytomed*, 2019; 9(5): 474-481.
- Alkandahri MY, Yuniarsih N, Berbudi A, Subarnas A. Antimalaria activities of several active compounds from medicinal plants. *Pharmacogn J.*, 2022; 14(1): 245-252.
- Verma RK, Kumari P, Maurya RK, Kumar V, Verma RB, Singh RK. Medicinal properties of turmeric (*Curcuma longa* L.): A review. *Int J Chem Stud.*, 2018; 6(4): 1354-1357.
- Alkandahri MY, Berbudi A, Subarnas A. Evaluation of experimental cerebral malaria of curcumin and kaempferol in *Plasmodium berghei* ANKA-infected mice. *Pharmacogn J.*, 2022; 14(6): 905-911.
- Xia ZH, Chen WB, Shi L, Jiang X, Li K, Wang YX, *et al.* The underlying mechanisms of curcumin inhibition of hyperglycemia and hyperlipidemia in rats fed a high-fat diet combined with STZ treatment. *Molecules*, 2020; 25(2): 1-15.
- Gupta VK, Malhotra S. Pharmacological attribute of *Aloe vera*: Revalidation through experimental and clinical studies. *Ayu.*, 2012; 33(2): 193-196.
- Yousef FM. Antihyperglycemic and antihyperlipidemic potential of *Aloe vera* against streptozotocin-induced diabetic rats. *Int J Pharm Phytopharmacol Res.*, 2017; 7(5): 41-46.
- Dai Y, Chen SR, Chai L, Zhao J, Wang Y, Wang Y. Overview of pharmacological activities of *Andrographis paniculata* and its major compound andrographolide. *Crit Rev Food Sci Nutr.*, 2019; 59(1): S17-S29.
- Resi EM. Effect of antimalaria herbal Sambiloto (*Andrographis paniculata* Nees.) on morphology changes of development and parasite *Plasmodium falciparum*. *Jurnal Info Kesehatan*, 2014; 12(1): 661-669.
- Nugroho AE, Andrie M, Warditiani NK, Siswanto E, Pramono S, Lukitaningsih E. Antidiabetic and antihyperlipidemic effect of *Andrographis paniculata* (Burm. f.) Nees and andrographolide in high-fructose-fat-fed rats. *Indian J Pharmacol*, 2012; 44(3): 377-381.
- Rafi M, Meitary N, Septaningsih DA, Bintang M. Phytochemical profile and antioxidant activity of *Guazuma ulmifolia* leaves extracts using different solvent extraction. *Indonesian J Pharm.*, 2020; 31(3): 171-180.
- Sutrisna E, Usdiana D, Wahyuni S. Hypocholesterolemia effect of *Guazuma ulmifolia* Lamk on rats model hyperlipidemic and liver histopathological picture. *Biomed Pharmacol J.*, 2022; 15(2): 1109-1113.
- Altaf R, Asmawi MZ, Dewa A, Sadikun A, Umar MI. Phytochemistry and medicinal properties of *Phaleria macrocarpa* (Scheff.) Boerl. extracts. *Pharmacogn Rev.*, 2013; 7(13): 73-80.
- Andriani Y, Tengku-Muhammad TS, Mohamad H, Saidin J, Syamsumir DF, Chew GS, *et al.* *Phaleria macrocarpa* Boerl. (*Thymelaeaceae*) leaves increase SR-BI expression and reduce cholesterol levels in

- rats fed a high cholesterol diet. *Molecules*, 2015; 20(3): 4410-4429.
26. Assi RA, Darwis Y, Abdulbaqi IM, Khan AA, Vuanghao L, Laghari MH. *Morinda citrifolia* (Noni): A comprehensive review on its industrial uses, pharmacological activities, and clinical trials. *Arabian J Chem.*, 2017; 10(5): 691-707.
27. Mandukhail SU, Aziz N, Gilani AH. Studies on antidyslipidemic effects of *Morinda citrifolia* (Noni) fruit, leaves and root extracts. *Lipids Health Dis.*, 2010; 9: 1-6.
28. Paikra BK, Dhongade HKJ, Gidwani B. Phytochemistry and pharmacology of *Moringa oleifera* Lam. *J Pharmacopuncture*, 2017; 20(3): 194-200.
29. Omodanisi EI, Aboua YG, Chegou NN, Oguntibeju OO. Hepatoprotective, antihyperlipidemic, and anti-inflammatory activity of *Moringa oleifera* in diabetic-induced damage in male wistar rats. *Pharmacognosy Res.*, 2017; 9(2): 182-187.