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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 arthrosclerosis, 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.

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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 (± 2.5%) in dried simplicia [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.

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