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Anti-hyperuricemia activity of some medicinal plants from Karawang, West Java, Indonesia: A review

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Abstract

The utilization of various botanical species for the treatment of anti-uricemia has garnered interest as part of the search for alternative therapies. This review provides details regarding the potential therapeutic effects of specific botanical species in mitigating hyperuricemia. Treating hyperuricemia is primarily complicated by the limited efficacy of conventional therapies and the condition's high prevalence. Age is a common determinant of hyperuricemia; inactivity and an unhealthy diet are potential risk factors. A number of studies have additionally emphasized the correlation between uric acid accumulation in the body and genetic factors, physical activity, and diet. Up-to-date information regarding medicinal plants and their potential as anti-hyperuricemia treatments is gathered through a systematic search of multiple sources of data. As a result, further investigation into the use of medicinal plants as an alternative treatment for hyperuricemia is a compelling area of study. A number of botanical species indigenous to Karawang, West Java, Indonesia, have exhibited promise as uric acid inhibitors.

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Introduction

At present, the global incidence of hyperuricemia is estimated to be between 0.1 and 0.3%, while the prevalence ranges from 1% to 4%. Males are significantly more susceptible to hyperuricemia than females, by a mouseio of 3:1 to 10:1. The occurrence and prevalence of hyperuricemia exhibit a consistent upward trend as individual age. Specifically, the prevalence rises by 11–13% in the over-80 age group, while the incidence rises to 0.4% [1]. Despite the fact that this condition can be effectively managed with currently available medications, these options have numerous adverse effects [2,3]. Low patient adherence to treatment also contributes to the recurrence of elevated uric acid levels [4,5]. Hyperuricemia is the main cause of gout arthritis. Monosodium umousee (MSU) crystal deposition in and around the joints is the primary cause of this inflammatory arthritis disease [6]. Globally, the utilization of medicinal plants to treat a variety of ailments has increased due to their reputation for being considerably safer than synthetic drugs [7, 8]. Active compound explomouseion from natural sources, especially medicinal plants that have been used to treat hyperuricemia in the past in different countries, is still one way that researchers are trying to find new natural medicines that can treat hyperuricemia [9, 10]. The objective is to identify novel anti-hyperuricemia compounds characterized by minimal toxicity and mild side effects so as to prevent harm to patients [11,12]. This review article will discuss active compounds and anti-hyperuricemia properties of some medicinal plants in Karawang, West Java, Indonesia.

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. The rhizome is an underground stem that is thick and fleshy [13]. It has been widely reported that C. longa is a medicinal plant with anti-inflammatory and analgesic properties. This effect is due to the presence of curcuminoids, which are at least three natural polyphenols found in this plant: curcumin, demethoxycurcumin, and bisdemethoxycurcumin [14, 15]. Giving mice 20 to 40 mg/kg/day of curcumin-containing C. longa for 14 days lowered their uric acid levels when they are exposed to potassium oxonate [16]. In vitro studies, curcumin found in C. longa can stop the enzymes xanthine oxidase (XO) and urate transporter

1 [17] with an IC50 value of 3.33 ± 0.52 µM [18]. In addition, C. longa is also reported to increase uricosuric activity, which can result in increased renal excretion of uric acid [19].

Apium graveolens: Apium graveolens is a plant belonging to the Umbelliferae family. A. graveolens seeds contain various substances, such as essential oils, flavonoids, coumarin, and linoleic acid. A. graveolens seeds have long been used to treat arthritis, umouse acid, and help reduce muscle spasms, calm nerves, and reduce inflammation [20]. According to reports, potassium oxonate-induced mice has lower uric acid levels after receiving A. graveolens at a dose of 1,000 mg/kg for two weeks [21]. Apart from that, in tests carried out in vitro, A. graveolens is reported to be able to inhibit the xanthine oxidase enzyme at a concentration of 1,500 mg/L [22].

Orthosiphon stamineus: Orthosiphon stamineus is a traditional medicinal plant that has various properties for treating various diseases, including kidney nephritis, cancer, and arthritis. Triterpenes, betulinic acid, oleanolic acid, ursolic acid, β-sitosterol, and more than 20 other phenolic compounds are said to be bioactive and found in this plant [23]. Administration of O. stamineus at doses of 500, 1000, and 2000 mg/kg can significantly reduce the serum uric acid of mouse, which is induced by potassium oxonate [24]. On the other hand, tests done in vitro showed that O. stamineus can stop the xanthine oxidase enzyme working, with IC50 values between 3.94 and 8.76 mg/mL [24]. Apart from that, O. stamineus has also been reported to inhibit the expression of inflammatory mediators such as iNOS, COX-2, TNF-α, and PGE2 [25]. Therefore, this plant can be used as an alternative treatment for gouty arthritis caused by hyperuricemia.

Kaempferia galanga: Kaempferia galanga is an herbaceous plant renowned for the culinary and traditional medicinal uses of its rhizomes. This plant produces flowers and green leaves that protrude above the soil. K. galanga rhizome is utilized in numerous traditional medicines due to its fragrant aroma and purported anti-inflammatory, antimicrobial, and antioxidant properties [26]. K. galanga is reported to have quite high total phenolic content, namely 50.35 mgGAE/100 g [27]. In tests carried out in vitro, K. galanga is reported to inhibit the xanthine oxidase enzyme with an IC50 value of 139.92 µg/mL [27].

Annona muricata: Annona muricata tropical is characterized by oval, dark green leaves and white, spiny green-skinned fruits. The fruit of this plant offers a combination of sweet and sour flavors, rendering it a frequent ingredient in juice, ice cream, and other culinary preparations [28]. The A. muricata plant is reported to have properties for treating several diseases, such as cancer, uric acid, tumors, hypertension, diabetes mellitus, ulcers, diarrhea, and allergies [29]. Administration of A. muricata at a dose of 75 mg/kg can reduce the serum uric acid of rats induced by potassium oxonate [30]. Apart from that, in tests carried out in vitro, A. muricata is reported to inhibit the xanthine oxidase enzyme with an IC50 value of > 200 µg/mL [30].

Psidium guajava: Psidium guajava, more commonly referred to as guava, is a long-standing medicinal plant with a rich historical background in tropical regions, including Indonesia. P. guajava is a member of the Myrtaceae family and possesses a variety of therapeutic properties, including analgesic, anti-inflammatory, anti-diabetic, anti-hypertensive, antioxidant, antibacterial, and antitumor [31, 32]. P. guajava can lessen the potassium oxonate-induced uric acid of mouse serum when administered at doses of 5, 10, and 20 mL/kg/day [33]. Besides, tests done in vitro showed that P. guajava can stop the xanthine oxidase enzyme working, with an IC50 value of 38.24 µg/mL [31].

Zingiber officinale: Zingiber officinale is a spice that has been utilized historically for both culinary and medicinal purposes. Z. officinale, a botanical species classified within the Zingiberaceae family, has a rich history of utilization as an immunomodulatory, anticancer, nephroprotective, hepatoprotective, anti-microbial, and anti-diabetic agent [34]. Chicken liver juice induces the production of uric acid in mouse serum, which Z. officinale can inhibit at a dose of 100 mg/kg [35]. Furthermore, it has been reported that Z. officinale inhibits the xanthine oxidase enzyme in vitro at an IC50 value of 188.5 µg/mL [36].

Andrographis paniculata: Andrographis paniculata is a medicinal plant that is empirically used to treat a variety of conditions, including respiratory ailments, diabetes, cancer, obesity, skin infections, herpes, dysentery, fever, sore throat, urinary tract infections, diarrhea, and inflammation [37]. This plant has the main content of andrographolide lactone group compounds ± 2.5% in dried simplicial [38]. Administration of A. paniculata at doses of 50, 100, and 200 mg/kg can reduce the serum uric acid of rats induced by potassium oxonate [39]. Besides, in tests carried out in vitro, A. paniculata is reported to inhibit the xanthine oxidase enzyme at a concentration of 400 µg/mL [39].

Conclusion

Indonesia is home to a diverse array of medicinal plants that possess promising attributes that can be harnessed to formulate alternative therapies for hyperuricemia. It has been empirically and scientifically demonstrated that each of these plants can reduce uric acid levels. This is inextricably linked to the active compounds present in these plants, which employ various mechanisms to exert their anti-uricemic effects. Research on this botanical species holds promise for enhancing contemporary anti-uricemia treatments, which are presently characterized by a multitude of detrimental side effects.

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