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Health Benefits Of *Annona Muricata* - A Review

Review Article

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Abstract

Natural derivatives from plants have proven to be useful in maintaining men's health. In recent past years, phytochemicals derived from plants have been a backbone for pharmaceutical discoveries. *Annonamuricata L.*, commonly known as soursop, graviola, guanabana, paw-paw and sirsak, is a member of the Annonaceae family. *Annonamuricata* is a coveted tropical tree, and a wealth of phytochemical investigations have been conducted for this fruit plant. In addition to being an important source for the food industry and an indigenous medicinal plant, *Annonamuricata* is proven to possess numerous biological activities such as anti-arthritic activity, anti-cancer activity, antimicrobial activity, anticonvulsant activity, Anti-diabetic and hypolipidemic activity, anti-inflammatory and anti-nociceptive activity, antioxidant activity, anti-hypertensive activity, anti-parasitic activity, antiplasmodial activity, hepato-protective and bilirubin-lowering activity, insecticidal activity, gastroprotective activity, molluscicidal activity, wound-healing activity. This review enlightens various biological activities of *Annona Muricata.*

Keywords: *AnnonaMuricata*; Graviola; Biological Activities; Anti-Cancer; Anti-Oxidant.

Introduction

Natural derivatives from plants have proven to be useful in maintaining human health. In recent years, phytochemicals derived from plants have been a backbone for pharmaceutical discoveries.[1] Hence the biologically active ingredients of plants have to be inspected thoroughly concerning their potential role in nature. Among the lot, AnnonaMuricata is one of the most extensively used traditional plants.[2, 3]

Annonamuricata L., commonly known as soursop, graviola, guanabana, paw-paw and sirsak, is a member of the Annonaceae family comprising approximately 130 genera and 2300 species.[4, 5]. *Annonamuricata* being native to the warmest tropical areas in South and North America is now widely distributed throughout tropical and subtropical parts of the world, including Malaysia and India. Annonamuricata is an evergreen, terrestrial, erect tree reaching 5–8 m in height and features an open, roundish canopy with large, glossy, dark green leaves. The edible fruits of the tree are large, heart-shaped and green in colour, and the diameter varies between 15 and 20 cm [4, 6, 7].

Fruits of Annonamuricata are taken internally to cure worms, fever, to increase mother's milk after child birth, and as an astringent for diarrhoea and dysentery; unripe fruit mixed with olive oil was used for neuralgia, rheumatism, and arthritic pain [8]. The leaves are used in traditional medicine to treat headaches, hypertension, cough, and asthma and used as antispasmodic, sedative, and nervine for heart condition [9]. Annonaceous acetogenins, from *Annonamuricata L.*, were found to be a promising new antitumor and anticancer agent in numerous in vitro studies [4]. These acetogenins were demonstrated to be selectively toxic against vari-

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ous types of the cancerous cells without harming healthy cells. Various other plants from this family have also been reported for their cytotoxic potential [10].

The leaves, root and stem barks of Annonamuricata afforded seven isoquinoline alkaloids: reticuline, coclaurine, coreximine, atherosperminine, stepharine, anomurine and anomuricine [11] The essential oil of the fresh fruit pulp of A. muricata yielded 2-hexenoic acid methyl ester (23.9%), 2-hexenoic acid ethyl ester (8.6%), 2-octenoic acid methyl ester (5.4%), 2-butenoic acid methyl ester (2.4%), β-caryophyllene (12.7%), 1,8-cineole (9.9%), linalool (7.8%), α-terpineol (2.8%), linalyl propionate (2.2%), and calarene (2.2%). [12, 13] The seeds of Annonamuricataafforded annomuricatin A.[14] Our research experience has prompted us in pursuing this review. [15-24] This article would help in understanding all the biological health benefits of Annonamuricata.

Biological Activities

There are several known biological activities likeanti-depressive [25, 26], toxicity against prostate PC-3 cancer cells [27], toxicity against pancreatic MIA PaCa-2 and colon HT-29 cancer cells [27, 28], toxicity against brine shrimp and different cancer cells [29], toxicity against lung A549, toxicity against human hepatoma cells, neurotoxic, breast MCF7, toxicity against oral KB cancer cells and brine shrimp larva, antileishmanial, molluscicidal and various others.[30] Several significant activities among these are:

Antioxidant Activity

The precursor for oxidative stress and which subsequently catalyses metabolic deficiency and cellular death through physiological and biochemical lesions are the immoderate generation of intracellular reactive oxygen species(ROS) [31] Identification of these antioxidants from natural products is very important as they play a crucial role in nullifying the destructive effects of ROS [31, 32]. Certain tests such as DRSA,FRAP and HRSA methanolic and aqueous leaf extracts of AnnonaMuricata leaves revealed the antioxidant properties. These extracts also help in protecting DNA against H_2O_2 (hydrogen peroxide) induced toxicity. Among the other species of AnnoaceaeFamily, Annonamuricata was found to have a stronger antioxidant activity through different models such as ABTS, nitric oxide and hydroxyl radicals [33, 34]. The seeds and leaves of the plant are reported to possess enzymatic antioxidants, including catalase and superoxide dismutase, and non-enzymatic antioxidants,including vitamin C and E [1]. The stem bark also showed antioxidant activity through DPPH test [35]. Thus, these above findings strongly suggest the potential use of Annonamuricataas a natural source of antioxidants.

Antihypertensive Activity

To evaluate the anti-hypertensive properties of Annonamuricata, Sprague-Dawley rats were administered with aqueous leaf extract(9.17-48.5mg/kg) [36]. The results have shown that the leaf extracts have quite significantly decreased the blood pressure in these rats without affecting the heart rate.This effect was suggested to be induced through peripheral mechanisms involving the antagonism of Ca2+ [37].

Gastroprotective Activity

To evaluate the gastro-protective of AnnonaMuricataleaves were examined against ethanol-induced gastric injury [37, 38] Oral administration of the ethyl acetate extract (200 and 400 mg/kg) have showed a significant activity in anti-ulcer activity, which had protective effects against gastric wall mucosal damage [37-39]. These findings strongly suggest the Gastroprotective activity of Annonamuricata.

Anti-cancer Activity

Cancer mortality rates have increased in the developed countries throughout this century and already as the cause death in some Western countries. Extracts of AnnonaMuricata have proven to show significant anti-cancer activity.[40] Ethyl acetate extract of leaves have proven to supress lung A549 cancer cells,colon HT-29 and HCT-116 [41] cancer cells by mitochondrial-mediated apoptosis ,cell cycle arrest at G1 phase. Water extract of the leaves had an effect on the rats prostate cancer by reduction in the prostate size. Ethanolic extract of leaves hada effect on breast tissues of mice prevention of DMBA by induced DNA damage [42], DMBA/croton oil induced mice skin papillomagenesis by suppression of tumor initiation and promotion, DMH induced colon cancer by reduction of ACF formation, K562 chronic myeloid lukemia cells by induction of apoptosis [42, 43] Leaves boiled in water had effect on metastatic breast cancer by stabilization of disease. Ethyl acetate of the leaves has also proven to have effects on azoxymethane induced colon cancer by reduction in ACF formation These findings strongly suggest the Anti-cancer activity of Annonamuricata.[44]

Conclusion

Annonamuricatais a coveted tropical tree, and a wealth of phytochemical investigations have been conducted for this fruit plant. In addition to being an important source for the food industry and an indigenous medicinal plant, Annonamuricatais proven to possess numerous biological activities such as anti-arthritic activity, anti-cancer activity, anti-microbial activity, anti-convulsant activity, Anti-diabetic and hypolipidemic activity, anti-inflammatory and anti-nociceptive activity, anti-oxidant activity, anti-hypertensive activity, anti-parasitic activity, anti-plasmodial activity, hepatoprotective and bilirubin-lowering activity, insecticidal activity, gastroprotective activity, molluscicidal activity, wound-healing activity[30]. Previously, this plant trails were neglected. This article is thus hoped to provide enlightment and motivation to other researcher' in conducting clinical trails and developing new pharmaceutical and agricultural agents.

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