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Annona Muricata: Cure to Cancer.

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ABSTRACT

Annona muricta synonymly called as soursop, graviola or paw-paw etc belongs to family Annonaceae. Annona muricata is an indigenous to most of the warmest tropical areas in South and North America, including Amazon and few parts of India. The plant has its own enormous curing aids in leaves, stem, roots flower, fruits etc. The fruit is edible making sherbets and drinks. The plant has exhibited its medicinal properties for decades. Phytochemical studies reveals lots of chemical composition like alkaloids, glycosides, terpenoids etc were found in different parts of the plants. It has been a boon to several tribal people and rural whom were using from past so many decades for curing so many ailments and diseases to people who are used to it traditionally.

Keywords: Annona muricata, soursop, phytochemicals, edible, boon

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INTRODUCTION

Annona muricata is a member of the family Annonaceae and it is fruit bearing tree with a long history of traditional use. Annona muricata, also known as soursop, graviola, guanabana, paw-paw etc.[1]

As well all know that natural products, especially those derived from plants have been using to help mankind sustain since, the dawn of medicine. Over past several century the phytochemicals in plants have been a pivotal pipeline for pharmaceutical discovery. Despite these studies, a restricted range of plant species has experienced detailed scientific inspection, and our knowledge is comparatively insufficient concerning their potential role in nature.[2]

Botanical Description and Distribution

Annonaceae, the custard apple family consisting of trees, shrubs or rarely lianas with about 2300 to 2500 species and more then 130 genera, it belongs to genus Annona and the family are concentrated in the tropics, with few species found in temperate regions. It is a small, upright tropical ever green, low branching and bushy but slender tree, which can reach height of 7.5- 9m. The large evergreen leaves are smooth and gloosy. The fruits are usually oval shaped an d10-30cm long and up to 15cm in width.[3]

Phytochemistry

Phytochemically graviola is rich in miscellaneous phyto constituents and compounds, including alkjaloids, megastigmanes, flavonol triglycosides, phenolics, cyclopeptides and essential oils. The leaf, stem, bark and seeds of graviola contain varying amounts of a novel group of chemicals believed to be biologically active called Annonaceous acetogenins. The presence of different major minerals such as potassium, calcium, sodium, copper, iron and magnesium.[1,2]

Presence of compounds in Annona muricata

Compound	Chemical type	Plant part	Plant origin
Annonatacin A	Misc lactone	Leaf, seed	Taiwan
Annomuricin	Misc lactone	Leaf	Indonesia
Annoniane	Isoquilone alkaloid	fruit	Surinam
Corozzolone	Misc lactone	seed	Guyana, Brazil
Muracin	Misc lactone	seed	Taiwan
Muricine	Alkaloid-misc	bark	Indonesia
Murin A, epoxy	Misc lactone	Stem, bark	India
Solamin	Misc lactone	Seed, stem, bark	Brazil, India

Source and Nutrition

The health and medicinal benefits of the custard apple fruit are numerous even though the leaves or seeds have also been shown ot possess significant bioactivity. It most abundantly found in West IndieS, Brazil, and few parts of India The flesh is fragment and swet, creamy white to light yellow. There is also flesh surround the seed which has to be consumed discarding the brownish black seed. Despite its high sugar content the glycemic index of fruit is low, the fruit has antioxidant activity making it suitable even for diabetic patients.

The Annona muricata also contains traces of sodium, magnesium, panthotenic acid, ascorbic acid and vitamins etc. It has about 3.1% of fibre in the edible portion.[4,5](fig.a,b.)

Graviola supplement pills

Graviola (Annona muricata) is an evergreen tree native to the Caribbean and Central and South America, from Brazil to the West Indies. It is also found in Southeast Asia and other humid areas. Graviola tree (Annona muricata) produces a delicious fruit which is widely consumed by indigenous peoples[6]. The fruit and the leaves of Graviola are used in traditional medicine for their tranquilizing and sedative properties.(fig.c.)

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This graviola product is 100% fine ground natural plant material.

Supplement facts:

Graviola-500gm

As dietary supplement, take 1 graviola capsule daily or as directed by physician or health care professional.[8]

Graviola has anticancer effects in-vitro but has not been studied in humans. Despite the lack of human data, many website promote graviola to cancer patients based on traditional use. Some companies sell a graviola supplement extract, but whether a graviola extract offers benefits beyond that of regular graviola whole powder is not known, [9,10]

Biological Activity:

Anticancer Activity

Plenty of studies report the significant antiproliferative effects of different extracts of the plant and isolated AGEs towards various cancer cell lines however, few of these studies have illustrated the underlying mechanism of action .Recent *in vitro* studies were performed by our research group to determine the mechanism of action of ethyl acetate extract of *A. muricata* leaves against colon cancer cells (HT-29 and HCT-116) and lung cancer cells (A549). The leaf extract was able to induce apoptosis in colon and lung cancer cells through the mitochondrial-mediated pathway. This antiproliferative effect was associated with cell cycle arrest in the G_1 phase.

In addition, the migration and invasion of colon cancer cells were significantly inhibited by the leaf extract.[11]

Anticonvulsant Activity

In African countries, the decoction of the *A. muricata* leaves is traditionally used to control fever and convulsive seizures .To substantiate the anticonvulsant activity of the leaves in ethnomedicine, Gouemo and colleagues investigated the effect of the ethanolic extract of the leaves against pentylenetetrazol-induced tonic-clonic seizures in mice. The result showed that the plant extract at 100 and 300 mg/kg doses significantly decreased the incidence and the mortality rate of tonic seizures. Administration of the extract to mice also lengthened the onset of clonic seizures. This study showed that a subsequent bioassay-guided investigation may lead to the isolation of a bioactive compound that can be used as an anticonvulsant drug.[12]

Antidiabetic and Hypolipidemic Activity

The chronic disease of diabetes mellitus afflicts a large proportion of people all around the world. Therefore, an effective natural adjuvant therapy would be blindingly beneficial to diminish diabetic complications and augment the quality of life for diabetic patients. Due to the traditional application of *A. muricata* against diabetes, several studies have investigated this potential *in vivo*. Adeyemi and colleagues reported that daily intraperitoneal injection of streptozotocin-induced diabetic Wistar rats with the methanol extract of *A. muricata* leaves (100 mg/kg) for two weeks significantly reduced their blood glucose concentration from 21.64 to 4.22 mmol/L . In addition, the extract at the same dose significantly decreased the serum total cholesterol, low-density lipoprotein, triglyceride and very low-density lipoprotein cholesterol.[13]

Anti-Inflammatory and Anti-Nociceptive Activities

Oral treatment in rats with *A. muricata* ethanolic leaf extracts (10, 30, 100 and 300 mg/kg) significantly reduced carrageenan-induced edema in rat paws by 79% in a dose-dependent manner, exhibiting its anti-inflammatory activities . This anti-inflammatory effect was accompanied by reductions in the leukocyte migration and exudate volume . Oral administration in mice with the same extract showed significant suppression of abdominal contortions induced with acetic acid (0.6% *v*/*v*), exhibiting a powerful anti-nociceptive activity . In addition, the formalin test and paw licking and hot-plate responses also corroborated the marked analgesic effect of the *A. muricata* leaves.[14]

Antioxidant Activity

Immoderate generation of intracellular reactive oxygen species (ROS) is a precursor of oxidative stress which subsequently catalyzes metabolic deficiency and cellular death through biochemical and physiological lesions . The identification of antioxidants from natural products has become a matter of great interest in recent studies for their noteworthy role in nullifying the destructive effects of ROS . DRSA, FRAP and HRSA tests on aqueous and methanolic leaf extracts of *A. muricata* revealed the marked antioxidative activities of both extracts accompanied with DNA protective effects against H_2O_2-induced toxicity.. The antioxidant activity of the *A. muricata* leaves was found to be stronger than *A. squamosa* and *A. reticulata* species as shown through different *in vitro* models, such as ABTS, nitric oxide and hydroxyl radicals.[15]

Antihypertensive Activity

To evaluate the antihypertensive properties of *A. muricata* leaves, aqueous leaf extract (9.17–48.5 mg/kg) was administered to normotensive Sprague–Dawley rats. The results demonstrated that treatments of rats with the leaf extract significantly decreased blood pressure in a dose-dependent manner without affecting heart rates. This effect was suggested to be induced through peripheral mechanisms involving the antagonism of Ca[16]

Antiparasitic Activity

Protozoal infections cause debilitating diseases, such as leishmaniasis and trypanosomiasis, which have both afflicted a noteworthy proportion of the world population. The development of resistance to

empirically discovered drugs represents a major hindrance to treatment of protozoal diseases. Moreover, in case of long-term usage, toxicity and several side effects have made the available treatments more unsatisfactory. As a natural agent, *A. muricata* has been subjected to various pathogenic parasites to determine its cytotoxic effects . The ethyl acetate leaf extract of *A. muricata* was assayed against three *Leishmania* species (PH8, M2903 and PP75) and *Trypanosoma cruzi*. Promising activity was reported with IC_{50} values lower than 25 µg/mL.[17]

Insecticidal Activity

Botanical insecticides can have a pivotal role in different agriculture programs, especially in small farming. Due to the presence of AGEs, plants from the Annonaceae family such as *A. mucosa* and *A. sylvatica* have shown to be promising biopesticides among tropical plants. An investigation on different *Annona* species showed the growth inhibition effect of *A. muricata* seeds and contact toxicity by topical administration to *Trichoplusia ni* larvae . In another study, different extracts of *A. muricata* seeds were examined against *Sitophilus zeamais*, a detrimental pest for stored grains, using ingestion and topical assays. Promising activity was obtained from the ingestion application of hexane and ethyl acetate extracts, and this activity was contributed to the presence of AGEs in the less polar fractions.[18]

CONCLUSION

Plant extract of Annona muricata exhibit diverse categories of pharmacological activities such as Anticancer, Antimicrobial, Cytotoxocity, Antioxidant, Antibacterial, Antiproliferative etc. Cancer research is ongoing on these important plants and plant chemicals, as several pharmaceutical companies and universities continue to research, testy, patent and to synthesize these chemicals into new chemotherapeutic drugs. However, only a small proportion has been investigated both phytochemical and pharmacological. There are gap in the studies, which need to be briged in order to exploit of Annona muricata. This plant also has wide spread use with extraordinary medicinal potential which should be better explore to find new biological properties which may increase its importance as efficient medicinal plant in biodiversity.

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