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Medicinal plant: *Garcinia spp.*

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Abstract— *Garcinia is a tropical fruit tree with promising pharmacological properties. This review presents an overview of the bioactive compounds derivative from Garcinia fruits and their biological activities for promoting human health as food and medicine.*

Keywords— ***Medicinal plant, Garcinia spp., Therapeutic properties, phytochemical properties.***

I. INTRODUCTION

Plants are considered as the great reservoir of structurally diverse bioactive molecules such as phenolics, terpenoids, carotenoids, anthocyanins and flavonoids which are having therapeutic values and are useful in the treatment of various ailments. Now-a-days these bioactive molecules are widely used in the food, pharmaceutical and cosmetics industries (Hosakatte *et al*., 2018).

Garcinia is a polygamous tropical tree or shrub under Clusiaceae family. It consists of 250 species, out of which about 30 species are indigenous to India. *Garcinia pedunculata* (Amlavethasa), *G. cowa*, and *G.Morella* (Indian gamboge) are grown in North-Eastern parts of India and Andaman Islands (Negi *et al*.,2008; Sharma and Devi,2015; Murthy *et al*., 2020). *Garcinia* are rich source of nutrients, minerals, vitamins, and dietary fibers. It has the folklore claims such as rejuvenator, cardio tonic, asthma, obesity and arthritis. The mature fruit is eaten cooked or raw and also for pickle preparation.

Garcinia pedunculata is an evergreen tree. The tree is endemic to the south eastern regions of Asia such as parts of Myanmar and North-Eastern parts of India. The tree has a fluted trunk with short spreading branches. Leaves are lanceolate with prominent mid ribs. Male flowers are light green in sparsely flowered panicles, the female flowers are solitary. The fruit is round with a diameter ranging between 8cm and 12cm. It has a juicy interior with edible arils. The mature *G. pedunculata* fruit is greenish yellow and is consumed as a vegetable.

II. MEDICINAL PROPERTIES OF GARCINIA

The fruits of *Garcinia* have been used since ancient times in traditional medicinal practices. These species provide a rich natural source of bioactive compounds with relevant therapeutic properties and anti-inflammatory effects, for the treatment of skin disorders, wounds, ulcers, dysentery, pain, infections, fever, cough, bronchitis, asthma, rheumatoid arthritis, obesity and having antioxidant, antiaflatoxigenic anti-inflammatory, leishmanicidal, and antiprotozoal activities (Joseph *et al*.,2005; Ali *et al*.,2017 ;Espirito *et al*.,2020).

III. PHYTOCHEMICAL PROPERTIES OF SOME SPECIES OF GARCINIA

Garcinia are rich sources of fiber, total phenols, and natural antioxidants with high amount of ascorbic acids .Extracts of the pericarp, epicarp, and seeds of *Garcinia* have demonstrated the phytochemicals such as pedunculol, garcinol, cambogin 3 and hydroxyl citric acid. Bennet and Lee (1989) and Rao *et al*.(1974;1980) have isolated the bioactive compounds namely benzoquinones, triterpenes and anthocyanins. Garcinol, being rich in derivates of poly-isoprenylated benzophenones, polyphenols, bioflavonoids (kolaviron, volkensiflavone, fukugetin) and xanthones (Sarma *et al*.,2016). Xanthones are the major class of phenolic compounds in *Garcinia* species, followed by benzophenones and biflavonoids. Xanthones have demonstrated effects against human cervical cancer, lung cancer cells, and hepatocellular carcinomas (Vo *et al*., 2015). These compounds have been associated with biological activities such as free-radical scavenging,

antiulcer effects, cytotoxicity, inhibition of nitric oxide synthase, chemoprevention of cancer, induction of apoptosis, anti-HIV, and trypanocidal effects (Hung *et al*.,2015; Fu *et al*.,2017). These compounds exhibiting a wide range of pharmacological activities such as antimicrobial, antioxidant, antitumour-promoting, cytotoxic, etc. (Jayaprakasha *et al*., 2006; Mundugaru *et al*., 2014;Adegoke *et al*.,1998; Asano *et al*.,1996; Bakana *et al*., 1987; Iinuma *et al*., 1996;Mackeen *et al*., 2000; Fu *et al*.,2014; Minami *et al*.,1994;1995;1996; Islam *et al*.,2015 ;Paul *et al*.,2017).Crude extracts as well as partially purified compounds from different parts of some species of *Garcinia* plants have shown potential antibacterial activities against *Bacillus cereus, Bacillus coagulans, Bacillus subtilis, Staphylococcus aureus* and *Escherichia coli*.

Some prominent *Garcinia* species are known to have good medicinal value and fruit extract has traditionally very well known for treatments of various diseases (Deore *et al*., 2011).

G. pedunculata was estimated to contain moisture 88.20%, protein 0.50%, *β* carotene 45.00mg/100 g, vitamins (thiamine 0.03, riboflavin 0.02, and ascorbic acid142.83mg/100 g, resp.), minerals (sodium 1.80, potassium106.00, calcium 18.00, magnesium 23.00, iron 0.08, zinc0.15, copper 0.12, and phosphorus 17.00mg/100 g), phenolics(19.45mg gallic acid/100 g), and flavonoids (18.33mg rutin/g).The dried fruit rinds and pericarp of *G. pedunculata* have been reported to contain some benzophenones, pedenculol, hydroxy citric acid, garcinol, and cambogin , some of which are strong antioxidants (Sahu *et al*., 1989; Mudoi *et al*.,2012; Ravi *et al*.,2014; Sarma *et al*.,2015; Mundugaru *et al*.,2019). This fruit extract is reported to possess a variety of pharmacological benefits including antimicrobial, anti-inflammatory, hepatoprotective, and cardioprotective properties (Kagyung *et al*., 2010; Mundugaru et al.,2014,2016; Ali *et al*., 2017). The aqueous extract of *Garcinia pedunculata*, exhibited significant neuroprotection against $AlCl_3$ induced neurotoxicity (Mundugaru *et al*., 2016, 2017).

In traditional system of medicine the leaves of *G. lancifolia* are used as stomachic and diuretic.The acidic fruits are used to prepare juice, pickle and curries. *G. lancifolia* is used as stomachic, diuretic and its fruit is used to cure dysentery and diarrhoea. The bark of *G. lanceifolia* has also been reported to contain prominent antibacterial and anthelmintic potential (Chowdhury and Handique, 2012;Bora *et al*.,2014a; 2014b). The phytochemical analysis of different extracts of *G. lancifolia* leaf, stem and fruit revealed the presence of tannins, saponins, flavonoids, terpenoids, alkaloids and cardiac glycosides. The high phenolic content was observed in the methanol extract of leaf followed by methanol extract of stem and dichloromethane extract of leaf.

Antimicrobial and free radical scavenging xanthones from the latex of *G. cowa* (Mahabusarakam *et al*., 2005; Na Pattalung *et al*.,1994; Auranwiwat *et al*.,2014), and antimalarial xanthones (Likhitwitayawuid *et al*.,1998 ;) from the stem bark of *G. cowa* have been reported.

A polyisoprenylated benzophenone known as garcinol isolated from stem bark of *G. huillensis* has been shown to possess chemotherapeutical activity against Gram-positive and Gram negative cocci .

Alpha-mangostin, rubraxanthone and xanthochymol isolated from *G. mangostana*, *G. diocia* and *G. subelliptica*, respectively, showed strong antibacterial activity (Iinuma *et al*., 1996).

Crude extracts of leaves, fruits, root, stem and trunk bark of *G. atroviridis* exhibited antibacterial (Mackeen *et al*., 2000).

IV. INDUSTRIAL RELEVANCE

This traditional medicines are assuming greater important because of its effective, safer, locally available and no side effects and more reliable medicine than synthetically produced drugs. *Garcinia* extracts can be utilized as nutraceuticals and as food biopreservatives which could be developed into value added products or medicine (Acuna *et al*., 2012; Biswas *et al*., 2017). To produce potentially more active and safer drugs the plant-derived compounds should be isolated which could improve the economy of pharmaceutical industries.

V. CONCLUSION

Though the fruits of *G. cowa* and *G. pedunculata* are underutilized, recent year the interests in research activities in the fields of chemistry and pharmacology has arisen in exploiting on the fruit species. The advanced technology for isolation of the bioactive compounds from plants is very important as it could help in structural modifications of the synthetic products from the fruits. Based on the mechanism and mode of action of these plants it is confirmed the curative and therapeutic effectiveness of the plant. Hence, much research effort on crop improvement and physiologically active components is needed.

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