

GARCINIA CAMBOGIA: AN ANCIENT FRUIT RIND WITH RECENTLY DISCOVERED THERAPEUTIC ACTIVITY

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ABSTRACT

The fruit rind of *Garcinia gummi-gutta* is known as *Garcinia cambogia*. *Garcinia cambogia* extract comes from a tropical fruit grown in India and Asia. It is used in digestive issues and other illness as home remedy. This is currently most widely used and popularly advertised as a weightloss supplement. Research has revealed it has presence of xanthenes (gambogiol) and benzophenones (garcinol) also organic acids (HCA) and amino acids (gammaaminobutyric acid) in various parts of plants. These *Garcinia cambogia* constituents have various biological activities. The HCA has anti-obesity activity, also reduced food consumption and body fat gain by modulating the serotonin levels, high fat oxidation and lowering lipogenesis process. HCA is an inhibitor of ATP-citrate lyase, which is a main catalyst for the conversion of citrate to acetyl-coenzyme A, plays a key role in fatty acid, cholesterol and triglycerides synthesis. The crude extract or constituents from the plant has hypolipidaemic, antidiabetic, anti-inflammatory, anticancer and hepatoprotective activities. One more recently discovered constituent from *Garcinia indica* and *Garcinia cambogia*, is Garcinol a polyisoprenylated benzophenone derivative. However, emerging studies suggests that garcinol could be useful as an anti-cancer agent, and it is a pleiotropic agent capable of modulating key regulatory cell signaling pathways. Here we have summarized the importance of HCA, garcinol and other constituents with its observed pharmacological activities.

INTRODUCTION

Garcinia cambogia is Malabar tamarind is a plant found in Southeast Asia. The dried fruit rind has used for long in Southeastern Asia as a food preservative, flavoring agent, now as dietary supplements for weight loss. Also as a conventional remedy to treat constipation, piles, oedema, irregular menstruation and intestinal parasites. Studies reported on this plant helped in isolation of various organic acids benzophenones, xanthonones etc as major constituents which indicated biological activity such as anti-obesity hypolipidaemic and anticancer activity. Commercial products containing *G. cambogia* available in the market have received positive and negative reports. *Garcinia* supplements contain from 20 to 60% hydroxy citric acid (HCA), and many of these products are a combination of different potential active ingredients also.

HCA, an α -, β -dihydroxy tricarboxylic acid, is the key component present in the fruit rind which may be responsible for its weight-loss property or anti-obesity property. The fruit contains approximately 10% to 30% HCA which can be isolated in the free form, as a mineral salt or as a lactone. In addition, HCA can be synthesised using citric acid as

starting material. Citric acid first undergoes dehydration to form aconitic acid, which forms hydroxycitric acid through oxidation. It is studied that HCA will lower weight-gain by inhibiting enzymes ATP-citrate lyase which catalysing step of citrate to acetyl-coenzyme A in fatty acid synthesis. Various studies suggested that HCA promotes weight-loss in humans without stimulating CNS. This review is overview biological activity of *G. cambogia* and HCA with other newer isolated components such as garcinol giving anti-cancer activity. [1-6]

CHEMICAL CONSTITUENTS OF *GARCINIA CAMBOGIA*

Preliminary phytochemical constituent's studies revealed the presence of alkaloids, flavanoids, phenolic compounds, saponins, tannins, carbohydrates and proteins. Up to date, a few xanthonones, benzophenones and organic and amino acids are found in various parts of the plant. Following are the details (Table no: 1): [7-12]

However, emerging studies suggests that garcinol could be useful as an anti-cancer agent, and it is a pleiotropic agent capable of modulating key regulatory cell signaling pathways. garcinol and other constituents with its observed pharmacological activities.

Table no: 1 Chemical constituents of *Garcinia cambogia*

NAME OF CHEMICAL CLASS	DESCRIPTION
Xanthones	<p>Garbogiol was isolated from the roots of the plant while rheediaxanthone A was isolated from the bark.</p> <p>The fruits yielded tetracyclic polyisoprenylated xanthones namely oxy-guttiferone I, oxy-guttiferone K, oxy-guttiferone K2 and oxy-guttiferone M.</p>
Benzophenones	<p>Garcinol and isogarcinol were reported from the bark whereas guttiferone I, N, J, K and M, the polyisoprenylated benzophenones, were isolated from the fruits.</p>
Organic acids	<p>HCA is the major organic acid occurring in the fruit and also the major active ingredient. Many organic acids ie: tartaric acid, citric acid and malic acid are minor constituents but more recent studies report only HCA. HCA lactone or Garcinia lactone was also isolated from the fruit.</p>
Amino acids	<p>The amino acids detected include arginine, asparagine, glutamine, threonine, glycine, proline, γ-aminobutyric acid, leucine, isoleucine, ornithine and lysine</p>

BIOLOGICAL ACTIVITY OF *GARCINIA CAMBOGIA*: (Figure 1)

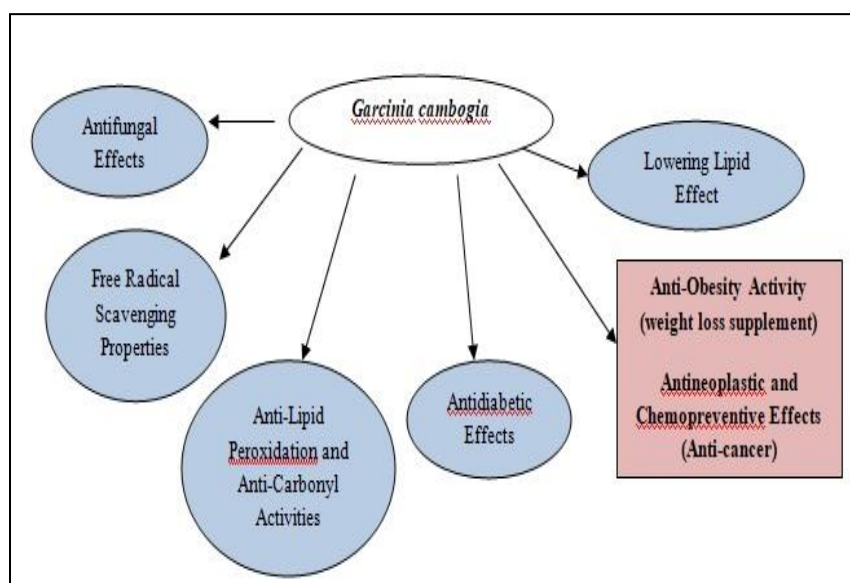


Figure 1: Biological activity of *Garcinia cambogia*

There is various pharmacological activity of this medicinal herb fruit out of which Anti-Obesity activity and anticancer are in highest research

ANTI-OBESITY ACTIVITY OF HYDROXYCITRIC ACID (HCA)

Garcinia cambogia is a small tropical fruit indigenous to India and Africa. Recent reports from the world health organization suggest that globally the number of obese people is increasing and with it the incidence of CVS diseases, diabetes, digestive diseases and cancer is also increasing alarmingly. In the natural source of medication, Garcinia is used to treat obesity and multiple studies have shown that hydroxycitric acid (HCA garcinia acid) a component of Garcinia is reported to possess antiobesity effects. Intake of hydroxycitric acid decreases appetite, blocks fat synthesis, lipogenesis, lowers food intake and decrease body weight in figure 2. The Garcinia is rich in HCA; the active agent helps in weight loss by blocking fat production and suppressing appetite. Garcinia has citrine extract (50- 60% HCA). This inhibit enzyme to synthesize fat storage in adipose tissue. This promotes production of energy, blocks lipogenesis, lowers production of cholesterol

fats, suppresses food appetite, and increases generation of body heat.

HCA work more for people who overeat when anxious or stressed, as it gives similar calming effect that they get from food. Also, you need not eat any special foods when you are taking HCA. [13]

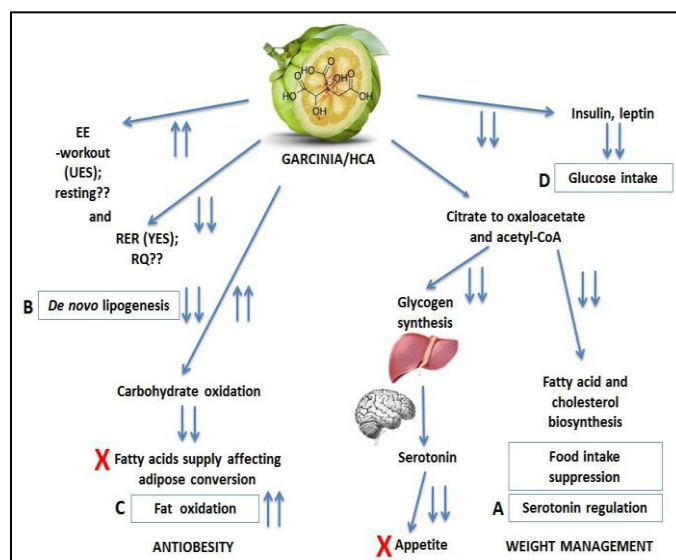


Figure 2: Mechanisms for Anti-obesity effect of Garcinia/HCA.

ANTICANCER PROPERTIES OF GARCINOL

Cancer is uncontrolled growth and spread of abnormal cells, may be initiated due to multiple factors including exposure to carcinogens, repeated genetic damage, by oxidative stress, chronic inflammation, or hormonal imbalance. Most chemotherapeutic treatments suffer from adverse toxic reactions leading to side

effects. Thus, it is important to develop novel approaches, which could potentially be both effective against cancer cell growth and relatively nontoxic and with no side effects. Recent evidence supports that nonnutritive components in diet have therapeutic benefits attributable to their pleiotropic effects including downregulation of survival signaling and simultaneous activation of multiple death pathways in cancer cells growth. *G. cambogia* has recently been extensively investigated for its anti-cancer activity, garcinol, isolated from *G. indica* and present in *G. cambogia* has received much scientific attention. Several recent studies have examined the potential of garcinol, a non-nutritive dietary component, against different cancer types. In the process, several possibilities that explain the underlying mechanism for the chemopreventative and/or therapeutic performance of garcinol have also arisen. These are summarized in (Figure 3). [14-16]

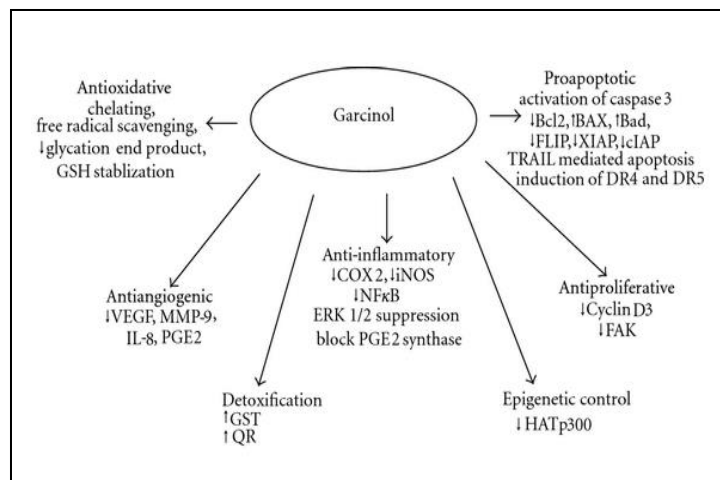
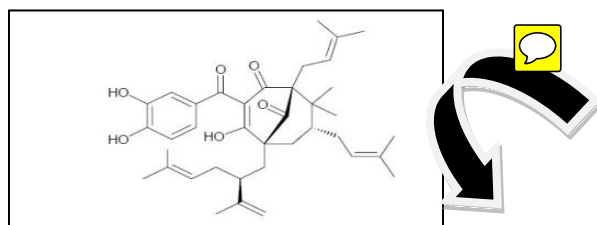


Figure 3: Anticancer activity of Garcinol: mechanistic targets.

CONCLUSION

G. cambogia fruit typically has high content of the organic acid, HCA as active ingredient. Several other constituents have been isolated from various plant parts having various therapeutic activities such as appetite-suppressant, anti-obesity and hyperlipidaemic activity. *G. indica* and *G. cambogia* exerted anticancer potential. The research undergoing at present is potentially very useful which calls out a need for careful planning and application of these therapeutic mechanism. However, detailed mechanistic studies are needed for potential beneficial effects of this fruit rind which having potential in human health and diseases.

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