ISSN: 2347-4742

Review Article

Journal of Pharmaceutical and Biomedical Analysis Letters

www.pharmaresearchlibrary.com/jpbmal

Garcinia Cambogia: An Awesome Superfruit for Healthcare

Raaz K Maheshwari*[1], Lalit Mohan[2], Bhavana Upadhyay[3]

[1]*Department of Chemistry, SBRM Govt PG College, Nagaur, Rajasthan, India*
[2]*Department of Zoology, Dayalbagh Educational Institute, Agra, UP, India*
[3]*Department of Zoology, Agra PG College, Agra, UP, India*

Abstract

Garcinia cambogia has been the subject of extensive phytochemical and physiologcal studies because of its derivatives used in human body metabolism. The major part of research activities concentrate on weight reduction and fat metabolism. Garcinia cambogia fruit's identified as a natural source of HCA which is chemically very similar to citric acid found in oranges and other citrus fruits. The herb is known to lower lipid levels and assists in overall weight loss. The rind of the Garcinia fruit contains an active component called hydroxycitric acid (HCA), which supports normal fat and carbohydrate metabolism, healthy appetite levels and optimum body weight Rather than the traditional uses and applications, recent studies revealed the pharmacological applications of HCA. It has been reported that HCA affects Lipid metabolism. Hydroxy citric acid has a respectable history of scientific investigation. HCA is found to be the first natural weight loss, compound without adversely affecting the CNS. This shows that Garcinia is not a stimulant, that it will not interfere with sleep and it will not cause changes in heart rate or blood pressure. Hence HCA is known as a safe fat fighting agent. Herbal supplement of HCA decreases adipose tissue weight after ingestion for few weeks. Several clinical studies have been undertaken to assess the efficacy of Garcinia Cambogia. At the moment the research is a little patchy and generally the medical community recommends more testing.

Keywords: *OTCS; HCA; LDL; CNS, Stimulation; Thermogenesis; Lactone; Serotonin ATPC; Citrate lyase; Fatty acid synthesis; Lipogenesis; Appetite; Antiobesity*

Contents

1. Introduction 80
2. Description 82
3. Conclusion 83
4. References 83

Corresponding author
Raaz K Maheshwari
E-mail: rkmgreenchem.jaipur@gmail.com
MS. ID: PRL2014-JPBMAL1954

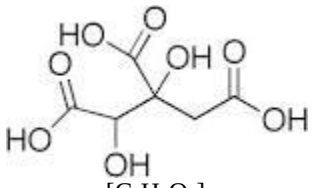
PAPER-QR CODE

1. Introduction

Garcinia (Latin name: *Garcinia cambogia (*Guttiferae) Desr., *G. gummi gutta* (L.) Rob Sanskrit/Indian name: *Vrikshamla, Kankusta*) grows in India in the evergreen forests of the Western Ghats, the Southern Konkan region and in Goa. It's also cultivated in the Southern districts of Maharashtra and on the lower slopes of the Nilgiris mountains.In the west coast of South India, *Garcinia cambogia* is commonly known as "Malabar Tamarind".

Scientific data showed that hydroxy citric acid is the major constituent present in *Garcinia cambogia*.The seeds contain 30 - 31% edible saturated fat resembling kokam butter obtained from *Garcinia indica.* The Garcinia fat is rich in oleic acid. Garcinia seed fat is used as cosmetic ingredient, since it has a good emollient feeling. The fruit itself resembles a undersized pumpkin that can range in size from that of a small orange to a larger grapefruit, and is generally green when unripe (slightly more oval in shape), and varies in color once ripened from red, orange, yellow to brown. It has deep longitudinal grooves (6-8) and 6 to 8 seeds, surrounded by a succulent aril. With exceeding sharp but pleasant acidity the fruit though edible, is eaten raw perhaps at meals, as an appetizer in the East lndies.

The active component in *Garcinia Cambogia*, hydroxycitric acid has been clinically proven to promote positive fat burning and appetite suppressing effects.The natural HCA in *Garcinia Cambogia* has shown to accelerate the metabolism of subjects in clinical trials and has become an accepted agent of weight loss in the battle to burn excess stored fat with genuinely exciting results. Scientific reports suggest (-) hydroxy citric acid found in *Garcinia* has tremendous effects in biochemical and physiological systems of animals and man. There are various products available for obesity and fat control they are generally stimulants which imparts side effects on CNS. HCA, on the other hand, works via peripheral mechanism to promote weight loss and assist the body's natural cycle in the liver and elsewhere, thereby influencing the metabolism of calories.



$[C_6H_8O_8]$

HCA inhibits the citrate lyase enzyme which is known to be an important catalyst in the metabolic process of converting excess carbohydrates into fat. Once this process is inhibited by HCA, the body's natural reaction is to increase carbohydrate oxidation which can result in drastic weight loss.

Dried fruit rinds of *Garcinia cambogia*

How Is Garcinia Cambogia Linked To Weight Loss

Garcinia Cambogia is said to boost weight loss in two different ways. Firstly, it blocks the enzyme in the liver that is responsible for the default function of converting sugar and carbs to fat. So instead of the fat cells getting plumper, GCE 'plugs' the fat cells and directs any sugar and carbs to the energy stores to be burnt off. The body is processing less fat and is under less stress, so less cortisol (the belly fat-creating hormone) is produced. The second way that it works is by sending signals to the brain that release more serotonin, our happy hormone, and this happiness stops us craving stress foods like sugar, carbs and salty foods and could have a positive impact on appetite suppression. The dried rind of *Garcinia cambogia* fruits have been used for centuries in Southern India as a

condiment for flavouring curries in place of tamarind or lime and as a food preservative. Having a long history of traditional use as preservative and flavouring material, *Garcinia cambogia* and its extracts have proved as safe for human consumption. Neither acute nor chronic toxicity is reported with regular consumption of *Garcinia* products as food or as dietary supplement.

Conventional Appliance of Garcinia Cambogia Fruit

The fruit rind and extracts of Garcinia species are used in many traditional recipes especially for fish curries. In the Indian Ayurvedic system these types of fruits having sour taste are said to promote digestion. Various species of *Garcinia* are used in food preparation in Thailand, Malaysia, Burma and other south east Asian countries [Wealth of India, Vol. IV]. The "Colombo curing" is a method of fish preservation in which the anti-bacterial properties of the *Garcinia* fruit are considered wealth of lndia. Apart from these uses in food preparations and preservation, the fruit juice possesses anti-scorbutic, anthelmintic and cardiotonic properties. Hence it finds application in the treatment of piles, dysentery, tumors, pains and heart complaint. The decoction of the fruit rind is given in is the word used for any nutritional herbal product which is marketed as OTCS (over the counter sale) products. The major market is in US, followed by Japan and Europe. *Garcinia cambogia* is a revolutionary component in neutraceutical dietary supplement areas as a source of Hydroxy citric acid (HCA), which is known as a weight reducing agent. In addition to tablets and capsules, it's marketed as biscuits, chewing gum, snack bar etc. Water-soluble HCA is available as soft drinks and beverages The modern applications are based on the fact that in the body carbohydrates of the food are broken down into glucose which is stored as glycogen. When glycogen storage is saturated, excess glucose is converted into fat and cholesterol. *Garcinia cambogia* extract inhibit body's conversion of glucose into fat and cholesterol by inhibiting certain enzyme process. The increase in glycogen stores, help significantly reduce cravings for food, reduce appetite and induce weight loss

Essential and Dynamic Ingredients

The active ingredients of *Garcinia cambogia* fruit's identified as (-) hydroxy citric acid (HCA) which provides characteristic acidic taste. Chemically HCA is very similar to the citric acid found in orange and other citrus fruits. Previously this was mistakenly identified as tartaric and citric acids. Now it's clear that the major acid is a di-hydroxy tri-carboxylic acid or hydroxy citric acid. HCA is 1,2 di-hydroxy propane **1,2,3**tri -carboxylic acid(Studies conducted on HCA molecule is known to have 4 isomers by varying the position of hydrogen and oxygen atoms, each with slightly different effects upon the body.).The sour taste of the fruit's mainly due to this compound. HCA is very unstable and usually exists as its lactone.

2. Description

HCA and Its Mode of Action

HCA reduces the conversion of carbohydrate calories into fats. It does this by inhibiting the actions of ATP - Citrate lyase, the enzyme that converts citrate into fatty acids and cholesterol in the primary pathway of fat synthesis in the body. Acetyl coenzyme A is the precurser of fatty acids. By inhibiting the formation of Acetyl coenzyme A, fatty acid synthesis is controlled. The actions of HCA increase the production and storage of glycogen (which is found in the liver, small intestine and muscles) while reducing both appetite and weight gain. HCA also causes calories to be burnt an energy cycle similar to thermogenesis.

(−)-Hydroxycitric acid [(−)-HCA] is the principal acid of fruit rinds of *Garcinia cambogia*, *Garcinia indica*, and *Garcinia atroviridis.* (−)-HCA was shown to be a potent inhibitor of ATP citrate lyase (EC 4.1.3.8), which catalyzes the extramitochondrial cleavage of citrate to oxaloacetate and acetyl-CoA: citrate + ATP + CoA → acetyl-CoA + ADP + P_i + oxaloacetate. The inhibition of this reaction limits the availability of acetyl-CoA units required for fatty acid synthesis and lipogenesis during a lipogenic diet, that is, a diet high in carbohydrates. *G cambogia* is claimed to lower body weight and reduce fat mass in humans. BS Jena

By inhibiting the actions of ATP-Citrate lyase, HCA reduces the availability of acetyl coenzyme A, the building block for fatty acid and cholesterol synthesis [Greenwood and Robinson, 1999. This may also cause the body to remove low density lipoprotein (LDL) from the blood. Effect of HCA on fatty acid synthesis and insulin release was

studied by well in research arena. The reduction in cholesterol synthesis is greater than the reduction in fatty acid synthesis. Animal trials have resulted in the reduction of triglycerides, cholesterol, food consumption and weight gain. Similar results were obtained when chromium was added to HCA in the diet.Tests to establish the appetite suppressing effects of HCA revealed that a single large oral dose or two divided oral doses resulted in a 10% or greater reduction in food consumption in experimental animals fed a high sugar diet. This result continued over many weeks with the chronic intake of HCA. The appetite control mechanism of HCA did not involve any conditioned aversion for food, i.e., HCA did not alter taste, cause gastric distress or illness, etc. Rather, this control stems from the Increased production of glycogen and concomitant stimulation of glucoreceptors in the liver, which results in early satiety through signals sent to the brain via the vagus nerve. Hydroxy citric acid suppresses the appetite by increasing the production of glycogen, which signal the brain to stop eating. It also enhances fat burning by interfering with malonyl Coenzme A, an enzyme involved in fat synthesis. One more mechanism suggested for the appetite suppression is its effect on Seratonin, which is a neutral vital Neurotransmitter. Seratonin is involved in a wide range of behavioral functions in the body, including mood, sleep and appetite control. lncreased plasma levels of Seratonin are associated with decreased food intake, reduced weight gain and increased energy expenditure. Scientific studies showed that hydroxyl citrates produced significant increase in serum Seratonin levels (45-70%) which in turn resulted in decreased food intake, reduced weight gain and increased energy expenditure. It's also observed that hydroxy citrate produced significant decrease in the serum leptin level. Leptin is a 167 amino acid protein hormone encoded by the obesity regulatory gene, synthesized and secreted by adipocytes (Fat cells). Two preliminary human trials suggest that HCA may work better when combined with chromium and I or other insulin potentiators and I or mimics. Diets high in fat and alcohol will reduce the lipogenesis inhibiting and appetite suppressing effects of HCA.

A thermogenic (heat - generating) effect has been postulated to account for some of the weight loss found experimentally using HCA. There are both theoretical and experimental evidences for suspecting that this may take place and for suggesting that L - carnitine is used in conjunction with HCA. However, no actual trials have been conducted to test the hypothesis. Other methods which are known to improve thermogenesis in the overweight, such as supplementation with sufficient quantities of GLA (gamma-linolenic acid), potassium and magnesium, might be used in conjunction with HCA without causing unwanted central nervous system (CNS) stimulation. Hydroxy citrates have many biochemical activities in the system. It inhibits fatty acid synthesis by rat liver *in vivo* and by perfused liver. It inhibits 13- hydroxysterol synthesis and also fatty acid synthesis in rat brain. It has been found out that HCA can increase seratonin release from isolated rat brain cortex. It's also proved that the Garcinia cambogia extract can inhibit lipid droplet accumulations in fat cells without affecting adipose conversion in .3T3-Ll cell. It has also been studied that the chromic administration of HCA promotes lipid oxidation and spares carbohydrate utilization in mice at rest and during exercise.

3. Conclusion

And this is no sweet treat! Sour and acidic, this fleshy fruit has long been used as a digestive aid in Ayurveda. *Garcinia Cambogia* Extract is taken from the rind of the malaban tamarind fruit, a fruit native to South East Asia and India. It has been used medicinally and in food preparation in its native home for centuries, because it has been said to boast the following properties:

- Souring agent, used in traditional Indian or South East Asian hot and sour curries
- Used for bowel problems and rheumatism; Contains HCA (Hydroxycitric Acid) which has been under the spotlight for weight loss
- Food preservative, coloring agent and curing agent
- Used as a carmative to prevent or expel excess gas formed in the GI tract

The bitter rind and extracts of *Garcini*a are most often used in cooking, as an ingredient in curries, or used as a condiment. It's also thought that the consumption of garnica can act as an appetite suppressant, making meals more filling and satisfying. The natural extract in the rind of the fruit, called hydroxycitric acid or HCA is thought to block levels of citrate lyase in the body, an important enzyme that helps with the creation of fat cells from carbs. Hydroxycitric acid (HCA), the main compound of *Garcinia cambogia* extract, is a competitive blocker of ATP-citrate-lyase, presenting a potential inhibition of fatty acid biosynthesis. A herbal formulation made from *Garcinia* is administered for rheumatism and bowel complaints. The herb is also revered as a potent anti-obesity agent. The hydroxycitric acid from *Garcinia* blocks the production and storage of fat and cholesterol in the blood when calorie consumption exceeds healthy levels.

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