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REVIEW ARTICLE **OPEN ACCESS**

A Review on Garcinia Extract in Weight Reduction

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ABSTRACT

Garcinia cambogia is a traditional plant whose extract has been traditionally used to reduce weight in individuals with obesity. The active principle the fruit of this tree is hydroxyl citric acid (HCA) which has been found to cause negative expression of genes associated with fatty acid synthetic cycle. This review article deals with mechanism of action, the beneficial as well as adverse effects of Garcinia extract in weight reduction in obese subjects.
Key words: *Garcinia, weight, reduction, hydroxyl citric acid, benefits, adverse effects.*

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INTRODUCTION

Garcinia cambogia (*Malabar tamarin*d) has originated in Southeastern Asian countries. This plant has small to medium- height. It belongs to the '*Guttiferae* family' which has approximately 180 species known till now. This tree is widely distributed across Polynesian islands, Asian and African countries.

Its fruit has an approximate diameter of 5 cms. It has been used for purposes such as- culinary and therapeutics for many centuries in Eastern India. Tamarind helps in attaining satiety following a meal and has therapeutic benefit in bowel diseases as a result of bacteriostatic activity which can be attributed to low value of pH. It has role in veterinary medicine in treatment of oral diseases among livestock.

The pulp of the fruit along with its rind have been traditionally used in therapeutics. These consist of higher amounts of (-)-hydroxy citric acid (HCA) which can be attributed to be primarily responsible for regulating body weight. The dried form of fruit comprises of approximately 10 % to 30 % of citric acid, majority of which is hydroxy citric acid (HCA). It has an identical structure with citric acid [1].

Hydroxy citric acid (HCA) has four isomeric types: (-) HCA; (+) HCA; (+) allo-HCA and (-) allo-HCA. (-) Hydroxy Citric acid is primary acidic component found within Garcinia fruit. The naturally occurring extracts in Garcinia are presently commercially available in form of calcium or potassium salts of (-)-HCA which comprise of approximately 60 % of Hydroxy Citric acid.

Bioavailability of hydroxy citric acid following intake of HCA-SX is fast due to rapid absorption. It remains labile in plasma for a long time [2].

Suggested mechanisms of action of Garcinia extract

Hydroxy Citric acid (HCA) was first of all identified by Watson and Lowenstein in 1970. It causes competitive inhibition of extra-mitochondrial enzyme- 'adenosine triphosphate-citrate (pro-3S)-lyase'. This enzyme acts by affecting extra-mitochondrial fatty acid synthesis. Hydroxy Citric acid causes reduction in Acetyl-CoA which limits fatty acids as well as cholesterol biosynthesis [3, 4].

Kovacs and Westerterp-Plantenga (2006) in their double-blinded, placebo-controlled randomized cross-over analysis conducted reported an rise in overall synthesis of fat in 'de novo' lipogenetic pathways due to inhibitory influence of hydroxyl citric acid over glycolytic pathway which results in an increase in rate of glycogen bio-synthesis in hepatic tissues. Hence, glycogen acts by influencing gluco-receptors within liver by induction of satiety via stimulation of vagus nerve. This contributes to suppression of intake of food and by causing a decrease in gain in body weight [5].

Hydoxy Citric acid results in improvement of serotonin release as well as availability. This neurotransmitter is involved in maintain a control over appetite. Ohia (2001 and 2002) had evaluated in vitro effects of administration of 1 mM Hydroxy citric acid over mice cerebral cortex. The study showed an increase in release of serotonin as well as its availability. [6, 7] Preuss (2004) noted identical results among humans [8].

Roy et al (2004) explained activity of Hydroxy citric acid over regulation of body's weight by modulating genes that are involved in metabolism of lipids along with carbohydrates and also, acts by communication of cell [9]. They observed that treatment of human adipocytes using HCA-SX resulted in significant amount of down-regulation of adipocytic tissue and genes associated with obesity which regulate hormone-sensitive lipases,Peroxisome Proliferator-Activated Receptors gamma (PPARγ) co-activator 1α, leptins and Hypoxia- Inducible Factor-1 genes. These support anti-lipolytic and anti-adipogenic functions of HCA-SX [10].

Evidence on adipolytic activities of Garcinia extract:

Leonhardt and Langhans in 2002 studied efficacy of oral administration of hydroxyl citric acid over intake of food and subsequent recovery from loss of weight. After ten days of restriction of intake of energy giving food and subsequent loss in weight, the study animals (rats) were provided with diet which contained 1 % or 12 % of fat and was supplemented using 3 % Hydroxy citric acid (in a dose of 1500 mg per kg) for a duration of 22 days.

Rats kept on hydroxyl citric acid demonstrated significantly reduced amount of gain in bodily weight when compared with controls. Although, chronic suppression in intake of food was only noted among rats which were fed with diet rich in 12 % of fat content [11].

Authors have variously described greater amount of loss of fat among subjects who were treated using *Garcinia* extract in comparison with subjects who did not receive the extract. [12, 13].

Kim et al (2013) in their study found that use of Garcinia extract supplements in dosage of 1%, w/w) for 16 weeks had no significant alterations in weight of body and intake of food. It was found to significantly reduce weight of visceral fat content along with size of adipocytes in obese mice. The anti-adipocytic activity of Garcinia extract was found to be partially linked with significant reduction in synthesis of fatty acid synthetase (FAS) activity and areas of white adipocytic tissue (WAT).

FAS, an important enzyme is responsible for *de novo* synthesis of fatty acids. White Adipocytic Tissue is one of the main sites of synthesis as well as storage of fatty acids [14].

Opala *et al* in 2006 in their double blinded clinical study trial demonstrated significant reduction in fat content in body among over-weight individuals who were prescribed with dietary supplementation of Garcinia for more than 12 weeks duration when compared with placebos [12].

However, Heymfield *et al* in 1998 in their study showed that treating with *Garcinia* did not result in significant loss in body weight and fat content when compared with placebo group [13].

Although human studies have demonstrated significant effects over bodily weight and content of fat when subjects with obesity were treated with *Garcinia* extract, no long term follow-up studied are there which have studied the longetivity of this treatment over twelve weeks of treatment.

Adverse effects of Garcinia extract use in obese individuals

Heymsfield *et al* in 1998 in their randomized, placebo-controlled parallel designed study evaluated efficiency of *Garcinia* extract containing 50 % concentration of hydroxyl citric acid over body along with low calorie and fiber rich diet. Few patients reported adverse events such as- gastro-intestinal symptoms, headache and upper airway obstruction [13].

Hayamizu *et al* in 2001 in their randomized and placebo controlled trial investigated effects of hydroxycitric acid in over-weighted and obese individuals. Treated patients showed greater reduction in visceral adipocytic accumulation which was measured using computerized axial tomography (CT) scan when compared to placebo study group. No adverse drug related events were attributed to Garcinia supplementation. However, a significant decrease in level of hemoglobin was noted [15].

Preuss *et al* in 2004 and 2005 reported no serious types of adverse reactions. Although, variety of adverse drug reactions for example, cramps in legs, heart-burn, diarrhea, flatulence, increase in appetite, headache, acidity and menstrual disorders were seen [16, 17].

CONCLUSION

Changes in one's life-style include dieting along with regular physical mode of exercises which are basis for successful loss of weight fir long term period. There is very little scientific evidence which supports efficient use of pharmacotherapeutical methods.

Most common reasons for inability to lose weight is non-compliance with weight loss program and use of other alternative methods or drugs available.

Garcinia extract has been shown to reduce weight in obese individuals with no side-effects in most individuals. However, there is scientific proof available which suggests few adverse effects such as hepatotoxicity, hyperacidity, diarrhea and disorders related to menstrual cycle.

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