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GARCINIA INDICA FOR METABOLIC SYNDROME - A REVIEW

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ABSTRACT

Metabolic Syndrome is clustering of components that include hypertension, hyperglycemia, hypertriglyceridemia, reduced high-density lipoprotein cholesterol (HDL-C), and abdominal obesity. *Garcinia indica* belonging to family Clusiaceae commonly called as 'Kokum' is found in Maharashtra, Goa and the south west regions of India. Fruits of *Garcinia indica* have been suggested in the Indian system of medicine for a number of diseases. It possesses hydroxyl citric acid which reduces appetite, inhibits fat synthesis, lipogenesis, decreases food intake and reduces body weight. So, it can be used for Metabolic Syndrome because weight loss is beneficial for treating all of the components of it. So this plant may be very useful in developing new formulations with more therapeutic and economical value for this medical condition.

Key words: *Garcinia indica*, kokum, metabolic syndrome, weight loss.

INTRODUCTION

The "metabolic syndrome" (Metabolic Syndrome) is a clustering of components that reflect over nutrition, sedentary lifestyles, and resultant excess adiposity. The Metabolic Syndrome includes the clustering of abdominal obesity, insulin resistance, dyslipidemia, and elevated blood pressure and is associated with other comorbidities including the prothrombotic state, proinflammatory state, nonalcoholic fatty liver disease, and reproductive disorders. Because the prevalence of the Metabolic Syndrome is increasing to epidemic proportions not only in the United States and the remainder of the urbanized world but also in developing nations. Most studies show that the Metabolic Syndrome is associated with an approximate doubling of cardiovascular disease risk and a 5-fold increased risk for incident type 2 diabetes mellitus. Lifestyle modification and weight loss should, therefore, be at the core of treating or preventing the Metabolic Syndrome and its components. The widespread occurrence of metabolic syndrome in

humans means that there is an urgent need to establish a better drug for its management[2]. It is well established that weight loss is beneficial for treating all of the components of the Metabolic Syndrome, including excessive adiposity, dyslipidemia, hypertension, insulin resistance, and hyperglycemia [3]. The magnitude of weight loss need not be drastic; the Finnish Diabetes Prevention Study showed that lifestyle intervention with modest weight loss significantly reduced the prevalence of the Metabolic Syndrome (OR, 0.62; 95% CI, 0.40–0.95) compared with the control group [4]. A 41% reduction in the incidence of the Metabolic Syndrome was also seen with the intensive lifestyle intervention of the DPP [5]. In addition, a weight loss as small as 5–10% of body weight can significantly reduce triglycerides and increase HDL-C[6]. Furthermore, both hypertensive individuals and individuals at risk for developing hypertension can see a significant reduction in blood pressure with modest weight loss [7-9]. Fasting blood glucose, insulin, and hemoglobin A₁C can also be decreased with modest weight loss [10]. Interestingly, a 7-d negative energy balance without measurable weight loss has also been shown to improve insulin sensitivity [11]. Notably, the DPP demonstrated that weight loss was the

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number 1 predictor of reduction in the incidence of diabetes [12]. In fact, for every kilogram of weight loss, the risk of diabetes development was decreased by 16%.

Garcinia indica has been used for centuries in Asian countries for culinary purposes as a condiment and flavoring agent in place of tamarind or lemon, and to make meals more filling. Fruits of *Garcinia indica* Linn have been suggested in the Indian system of medicine for a number of diseases. These include its usefulness as an infusion, in skin rashes caused by allergies, to relieve sunstroke, remedy for dysentery, an appetizer, liver tonic, to allay thirst and as a cardiogenic. Its seed contains 23-26% oil, which is used in the preparation of medicines and cosmetics. The outer rind of the fruits of *Garcinia indica* Linn has been shown to have antioxidant activity [13-16]. The fruit rind also contains polyisoprenylated benzophenones, garcinol, its isomer isogarcinol, xanthochymol, and isoxanthochymol [17]. The rind also contains hydroxycitric acid (HCA), hydroxycitric acid lactone, citric acid and oxalic acid. The fruit also contains other compounds including malic acid, polyphenols, carbohydrates, anthocyanin, pigments and ascorbic acid. Garcinol has antioxidative, chelating, free radical scavenging, antiglycation, anticancer, anti-inflammatory, and antiulcer activities [18-21]. Hydroxycitric acid has been patented for use as a hypocholesterolaemic agent [22-24]. Kokum contains other compounds with potential antioxidant properties include citric acid, malic acid, polyphenols, carbohydrates, anthocyanin flavonoids and ascorbic acid [25-28].

In the Ayurvedic system of medicine, kokum is used to treat illness related to obesity and multiple studies have shown that hydroxycitric acid (also known as garcinia acid) a component of kokum is reported to possess anti-obesity effects [23]. Studies have shown that consumption of hydroxycitric acid reduces appetite, inhibits fat synthesis, lipogenesis, decreases food intake and reduces body weight [29-30]. Mechanistic studies have shown that it is a competitive inhibitor of the extra-mitochondrial enzyme ATP-citrate lyase that catalyzes the extra mitochondrial cleavage of citrate to oxaloacetate and acetyl-CoA, an important precursor involved in the initial steps of de novo lipogenesis in the liver [31]. Hydroxycitric acid also inhibits pancreatic α -amylase and intestinal α -glucosidase, leading to a reduction in carbohydrate metabolism [32]. It also inhibits synthesis of fatty acid and lipogenesis from various precursors [31]. Concomitantly, it also increases the synthesis of hepatic glycogen thereby activating the glucoreceptors and causing a sensation of reduced appetite and fullness [33]. Prevention of carbohydrate conversion to fat by HCA thus induces the body to oxidize the excess carbohydrates, promoting glycogen storage, which in turn may play a part in suppressing the appetite [34]. Furthermore, HCA suppresses the feeling of hunger by increasing the release/availability of serotonin, a neurotransmitter that

regulates eating behavior and appetite control [35-36]. The various phytoconstituents such as, flavonoids, tannins, polyphenols, carbohydrates, saponins and Vit. C have shown hypoglycemic activity [37-38]. These phytoconstituents present in the *Garcinia indica* fruit and the regenerating property on pancreas be responsible for the hypoglycemic activity. The preliminary qualitative phytochemical analysis of aqueous extract showed presence of carbohydrate, steroids, flavonoids, alkaloids tannins, citric acid and Vit.C [39].

BOTANICAL STUDY



Kingdom	Plantae
Order	Malpighiales
Family	Clusiaceae
Subfamily	Clusioideae
Tribe	Garcinieae
Genus	Garcinia
Species	<i>Garcinia indica choisy</i>

AYURVEDIC PROPERTIES

Guna: Laghu, Ruksha

Rasa: Madhuramal (ripened fruit), Amla (unripened fruit)

Vipak: Amala

Virya: Ushan [1]

Synonyms: Vrikshamla, Kokum butter tree, Kokum, Goa butter tree, Mangosteen.

PLANT DESCRIPTION

Kokum tree is dioecious (having separate male and female plants) and grows up to a height of 12 to 20 m. The tree has branches that are drooping and the canopy is dense with green leaves. The leaves are simple, opposite, elliptic or oblong and deep green in color in the upper side, while pale in the lower side. The flowers are fleshy, dark pink, solitary or in spreading cluster. The mature trees flower annually during the winter in the months of November–February. The fruits are round, oblong or oval with pointed tips and are crowned by the four parted stalkless stigma. When raw they are dark to light green in color and crimson

red with a yellow tinge to dark violet or purple when fully ripe. The fruits are initially small and grow up to the size of a lemon. The process of fruiting takes approximately five months to complete and by May, the ripe fruits are ready for harvesting [1].

Distribution – Found throughout Western Ghats; especially Konkan areas, Maharashtra.

Useful parts: oil, Fruits, rootbark

CONCLUSION

From this study, we can conclusively state that *Garcinia indica* possess diverse health benefits but it has potential to be used in Metabolic Syndrome.

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