

Diuretic Activity of Leaves of *Garcinia Cambogia* in Rats

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Mathew, *et al.*: Diuretic Activity *Garcinia Cambogia*

The present study was undertaken to establish the diuretic activity of ethanol and aqueous extract of dried leaves of *Garcinia cambogia* in rats. Aqueous and ethanol extracts of leaves were administered to experimental rats orally at doses of 100 and 200 mg/kg and compared with furosemide (20 mg/kg, intraperitoneally) as the standard. The parameters measured for diuretic activity were total urine volume, urine concentration electrolytes such as sodium, potassium and chloride have been evaluated. The rats treated with ethanol extract of *Garcinia cambogia* and aqueous extract of *Garcinia cambogia* in a dose of 100 and 200 mg/kg showed higher urine output when compared to the respective control. Both ethanol and aqueous extracts have showed a significant dose-dependent increase in the excretion of electrolytes when compared to the control group.

Key words: Aqueous extract, diuretic activity, ethanol extract, *Garcinia cambogia*

Garcinia cambogia, is a member of the *Guttifererae* family. It is a small, sour fruit of an evergreen tree that grows in India and southeastern Asia. It is the source for a revolutionary natural diet ingredient, which is currently a range in America, Japan, Europe and other western countries. In Ayurveda, it is believed that sour flavors, such as those from *Garcinia*, activate digestion. *Garcinia* has also been considered to make foods more filling and satisfying, and has been used routinely for many centuries with no known toxicity. This herb has been used historically in India to support the treatment of various health conditions^[1]. As a chemical constituent of *Garcinia cambogia* a new xanthone, garbogiol was isolated from its root^[2]. The major organic acid in *Garcinia cambogia* has been found to be (-)-hydroxycitric acid present in concentrations of 16-18%, using HPLC, with 10 mM sulphuric acid as eluent^[3]. It was found that *Garcinia* extract inhibits the cytoplasmic lipid accumulation as well as adipogenic differentiation of preadipocytes^[4]. *Garcinia cambogia* extract, a herbal preparation has been suggested as useful in the treatment of gastrointestinal disorders^[5], obesity^[6], cancer^[7], inflammatory conditions^[8] and hyperlipidemias^[9].

Literature review indicated that the plant extract has yet not been screened for evaluating its diuretic activity. So the present study was taken up to evaluate diuretic activity of the plant extract in rats. Leaves of this plant collected from the botanical garden of Palakkad during the month of March 2010 and were identified at the Department of Botany, Govt. Victoria College, Palakkad. An voucher specimen has been deposited in our research laboratory for future reference. Leaves of the above plant was collected and dried under shade at room temperature for 15 days and then homogenized to get a coarse powder. Petroleum ether, ethanol and aqueous extracts of the leaves of *Garcinia cambogia*, were prepared by

Soxhletion. In this extraction procedure 45 g of the dried powder was extracted with 500 ml of the above solvents. After successive extraction, slurry was obtained and which is evaporated to yield solid.

Various tests were employed to find out the phytoconstituent present in the extracts^[10]. Preliminary phytochemical analysis showed the presence of carbohydrates, proteins, alkaloids, glycosides, flavonoids, and triterpenoids like phytoconstituents in the extracts of the leaves of *Garcinia cambogia*. Male albino rats weighing between 150-200 g were used for the present study. Furosemide was supplied by Micro Labs Private Ltd., Bangalore, India. The solvents, used in the extraction were obtained commercially and were of analytical grade.

Male rats were maintained under standard condition of temperature and humidity. The method of Lipschits *et al.*^[11], was employed for the assessment of diuretic activity. The experimental protocols have been approved by the Institutional Animal Ethical committee. Four groups of six rats in each were fasted and deprived of water for 18 h prior to the experiment. The first group of animals served as the control group, received normal saline (25 ml/kg, p.o.); the second group received furosemide (100 mg/kg, i.p.) in saline; the third and fourth groups received the ethanol and aqueous extract at a dose of 200 mg/kg, respectively, in normal saline. Immediately after administration the animals were placed in metabolic cages (2 per cage), specially designed to separate urine and feces, kept at room temperature 25±0.5° throughout the experiment. The urine was collected in measuring cylinders up to 3 h after dosing. During this period, no food or water was made available to animals. The parameters taken for individual rat were body weight before and after test period, total concentration of Na⁺, K⁺ and Cl⁻ in the urine. Na⁺, K⁺

TABLE 1: DIURETIC ACTIVITY OF ALCHOLIC AND AQUEOUS EXTRACT OF *GARCINIA CAMBOGIA*

Experimental group	Dose	Urine volume (ml/24h)	Total sodium (mEq/l)	Total potassium (mEq/l)	Total chloride (mEq/l)	Na ⁺ /K ⁺
Control (Normal saline)	25 ml/kg	16.65±0.5	65.45±1.3	69.09±1.6	543.78±0.3	0.9473
Furosemide	20 mg/kg	35.80±0.3*	165.47±2.2*	167.45±2.2*	2987.65±0.4*	0.9881
EEGC	100 mg/kg	22.64±0.8*	143.76±1.3*	147.23±2.4*	1867.43±0.2*	0.9764
EEGC	200 mg/kg	28.67±0.5*	152.43±2.6*	153.21±2.6*	2346.54±0.5*	0.9949
AEGC	100 mg/kg	19.43±0.9*	126.42±3.2*	127.34±3.4*	1657.54±0.3*	0.9927
AEGC	200 mg/kg	23.21±0.5*	146.67±2.8*	144.65±3.8*	2012.33±0.3*	1.0156

*Denotes a significant difference when compared to control values at $P < 0.05$, EEGC: Ethanol extract of *Garcinia Cambogia*, AEGC: Aqueous extract of *Garcinia Cambogia*

concentrations were measured by flame photometry and Cl⁻ concentration was estimated by titration with silver nitrate solution (N/50) using three drop of 5% potassium chromate solution as indicator. The data was analyzed using Student-t test for statistical significance and the level of the probability was set ≤ 0.05 .

In the present study, we can demonstrate that ethanol and aqueous extract may produce diuretic effect by increasing the excretion of sodium, potassium and chloride. The control of plasma sodium is important in the regulation of blood volume and pressure. The control of plasma potassium is required to maintain proper function of cardiac and skeletal muscles. The regulation of sodium, potassium balance is also intimately related to renal control of acid-base balance. The Potassium loss that occurs with many diuretics may leads to hypokalemia. For this reason, generally potassium-sparing diuretics are recommended^[12]. In present study, treatment with aqueous and alcohol extracts resulted in elevated levels of potassium in urine, which may increase risk of hypokalemia and hence its potassium sparing capacity has to be investigated. Active principles such as flavanoids, glycosides are known to be responsible for diuretic activity^[13]. The results from the Table 1 clearly showed that the extract of both ethanol and aqueous extracts of *Garcinia cambogia* act as diuretic in a dose-dependent manner. It may be suggested that these secondary metabolites presence indicated from the preliminary screening of the prescribed plant extract^[14].

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