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ANTIHYPERLIPIDEMIC EFFECTS OF *GARCINIA INDICA* ON THE BLOOD BIOCHEMICAL PARAMETERS IN ALBINO RAT

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ABSTRACT

The present investigation was carried out to evaluate the antihyperlipidemic effects of *Garcinia indica* fruits extract was given (250mg/kg body wt.) for 7, 15, 30, 45 and 60 days respectively. The treatment decreased total cholesterol, LDL and triglyceride while increased HDL significantly. The results clearly show that the fruits extract of *G. indica* has potent antihyperlipidemic activity.

KEYWORDS: ***G. indica, lipid profile, Garcinia indica, total cholesterol, LDL and triglyceride.***

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INTRODUCTION

Ayurveda is the vedic system of health care that developed in India over 5000 years ago. It was codified by the sage physician Charak and the surgeon Shushruta. Ayurveda is a holistic system of medicine from India that use constitutional model[1]. In recent times focuson plant research has increased all over the world and a large number of evidences have collected to shown immense potential of medicinal plants used in various traditional system[2]. In Ayurveda, ischemic heart disease (IHD) is known as hridroga. *Garcinia* helps in maintaining the cholesterol level at the normal rate, as it contains the antioxidant properties similar to the vitamin E. It strengthens the heart muscles and maintains the heart function properly[3]. It also improves functioning of cardiac muscles. Garcinia is used for the treatment of coronary artery disease, heart failure, edema, angina and hypercholesterolemia[4]. *Garcinia indica*, a plant in the mangosteen family (Clusiaceae), commonly known as kokum is a fruit tree, that has culinary pharmaceutical and industrial uses. The fruit is round about the size of a kiwi, and when ripe has a red purple colour[4] to treat sores, dermatitis, diarrhea, dysentery, ear infection, and to facilitate digestion, funfact: kokum juice is mixed. ATP citrate lipase is an enzyme that cleaves citrate, produces oxaloacetate and acetyl-CoA (a key molecule used in fat storage) [4]. The HCA inhibits this crucial catalytic reaction, thus preventing glucose conversion to fat. The kokum fruit is cooling antiseptic purifies the blood and fights cholesterol[5]. Hydroxy citric acid is mainly found in the rind of the fruit. It is shown that HCA can inhibit the enzyme, citrate lyase, which is needed for conversion of carbohydrates into fats[6]. This study was thus initiated with the aim of evaluating the effect of the aqueous fruit extract of *Garcinia indica* on the blood biochemical parameters in albino rat.

MATERIALS AND METHODS

1. The colony of albino rats was breed in the animal house of zoology department, school of life science. Sixty healthy male albino rats of almost equal size, weight (120-180gm) and age (8 weeks) were selected for the present study. The albino rats were housed in polypropylene cages maintained in controlled temperature (25±5^{0}C) humidity (65±10%) and light cycle (12hrs light and 12 hrs dark). They were fed with godlmohar brand feed (manufactured by Lipton India Pvt. Ltd., New Delhi) and water *ad libitum*. Plant material and preparation of aqueous extract standard protocol was drawn up in accordance with good laboratory practices (GLP) regulation of WHO (1988)[7]. The fruit of *Garcinia indica* was collected from the plant house and identified taxonomically by department of Botany, School of Life Sciences, khandari campus, Dr. B.R. Ambedkar University, Agra. For the preparation of aqueous extract of *G. indica* (1kg) churned fruits was mixed with 1 litre of water and kept at room temperature for36 hours. The slurry was stirred intermittently for 2 hours and left over night. The mixture was filtered and freezed from solvent under partial vacuum at 35^{0}C-45^{0}C to obtain the pulp. few drops of silicon emulsion was added near the end of distillation in soxhlet apparatus for 6 hours to avoid frothing. The residues were collected as thick pink gummaceous paste. This material was stored in the freezer and was administered to the experimental animals.[8-9] Albino rat were starved for 24 hours and divided into a placebo control group and experimental group. The selected sixty albino rats of almost equal weight and size were divided into six groups of ten rats each. The one group of Albino rats was treated as control group and the rest five groups of rats were given aqueous fruit extract of *Garcinia indica* (250ml/kg body weight)[10]. The aqueous fruit extract of *Garcinia indica* was administered for a period of 7, 15, 30, 45 and 60 days respectively. The fresh blood was taken in the sterilized centrifuged glass tubes, and kept undisturbed in vertical position for about two hours at room temperature When the blood just starts clotting, centrifugation was done at 2000rpm for about thirty minutes, to remove any suspended red cells Now the supernatant serum was separated from the cell debris by a filter paper. The serum samples obtained were subjected to biochemical parameter analysis i.e., total cholesterol[11], HDL, triglycerides[12]. All the data were statistically analyzed by using students 't'

test and ANOVA. All results were expressed as mean±SEM.

RESULTS

In whole experiment results of *Garcinia indica* treated groups were compared with that of control group. The cholesterol in serum of albino rat decrease significantly ($p<0.05$) after 7, 15, 30, 45 and 60 days of *Garcinia indica* treatment (Table-1). High density lipoprotein in the serum of albino rat increased ($p<0.05$) significantly after 7, 15, 30, 45 and 60 days of *Garcinia indica* treatment (Table-1). Low density lipoprotein in the serum of albino rat decreased after 7, 15, 30, 45 and 60days after *Garcinia indica* treatment (Table-1). Triglyceride in serum of albino rat decreased highly significant ($p<0.01$) after *Garcinia indica* treatment (Table-1).

Table 1
Effect of Garcinia indica on the lipid profile in albino rats

Groups	Cholesterol	HDL	LDL	Triglyceride
Control group	90.18±0.608	48.98±0.505	13.48±0.486	69.38±1.367
7 days±G.I.	88.34±0.650^{NS}	50.16±0.833^{NS}	13.06±0.474^{NS}	68.46±1.56^{NS}
15 days±G.I.	88.06±0.501^{NS}	51.73±0.783^{NS}	11.40±0.463^{NS}	67.34±1.60^{NS}
30 days±G.I.	81.78±0.480***	54.55±0.746**	9.81±0.44***	64.11±1.576^{NS}
45 days±G.I.	79.89±0.464***	55.19±1.161***	9.36±0.435***	64.16±1.591*
60 days±G.I.	77.38±0.348***	56.13±0.611***	8.54±0.405***	63.68±1.631*

n = 10
NS – p>0.05; * - p<0.05; ** - p<0.01; *** - p<0.001

DISCUSSION

The cholesterol is undoubtedly most publicized lipid in the nature, because of its strong correlation with high levels of serum cholesterol and the incidence of cardiovascular diseases. In the present study, the total cholesterol level in the serum of albino rat decreases successively with an increased treatment period due to hypolipidemic activity of *Garcinia indica* aqueous extracts and can also be correlated with decreased LDL, VLDL and TG levels in serum (*vide infra*) while HDL level increased in the serum. similar decreased level of cholesterol have also been reported in albino rats [13],[14]. Some authors The present study results are in confirmation with the already reported results[15]. The HDL which contains fifty percent protein with smaller concentration of the lipid are synthesized in the liver and also in intestinal epithelium during absorption of fatty acids from the intestine. In the present study the HDL level increased in serum after treatment of aqueous extract of plant and can also be correlated with decreased cholesterol, LDL, VLDL and TG levels. Similar findings have also been reported[16] and in albino rats after treatment of an extract of. *Terminalia arjuna*[17] Some researchers have also reported the trend in albino rats after treatment with *Garcinia indica*[18]. The LDL is the most atherogenic lipoprotein and their high levels are regarded as major risk factor for CHD. The LDL is formed in the circulation by progressive removal of TG from the VLDL and hence these become cholesterol rich particle and are synthesized in the liver. In the present study, the LDL level in the serum of albino rat decreased successively with an increase treatment period due to overall well being and hypolipidemic activity of *Garcinia* extract and can also be correlated with decrease cholesterol, VLDL and TG levels, while increased HDL level. Similar decrease has also been reported[19] in white rock mini cocks due to various metabolic effects of *Garcinia indica* on cholesterol biosynthesis and in rats due to *Terminalia catappa* caused close relationship between glucose and cholesterol metabolism[20]. The TG is the most abundant of the all lipids. In the animals the adipocytes contain a large quantity of TG in the form of fat droplets and are transported in the plasma mostly in the form of large TG rich lipoprotein droplets called chylomicrones and VLDL. When TG is metabolized their fatty acids are released to the cells and converted into energy. In the present study, the triglyceride level in the serum of albino rat decreases

successively with an increased treatment period due to overall well being and hypolipidemic activity of *Garcinia indica* aqueous extracts it can also be correlated with decreased cholesterol, LDL and VLDL, while increased HDL in the serum. Similar findings have also been reported in rats due to *Garcinia indica* FXR controls a variety of genes cruicially involved in TG metabolism in blood compartment[21]; in rats, *Garcinia indica* decreased the intestinal absorption of lipids in the body and resulted in low occurrence of glycerol apart from protecting TG elevation by inhibiting its oxidation[22]. Therefore in the present study cholesterol, LDL, TG showed significant decline while HDL showed significant elevation in the serum after oral administration of aqueous extract of *Garcinia indica* aqueous extract for 7, 15, 30, 45 and 60 days respectively. The aqueous extract is very effective.This difference with other authors may be attributed to conditional effect of its pharmacological actions perhaps they act via different mechanisms.

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