Faculty of Home Economics

Journal of Home Economics
Print ISSN: 2735-5934, Online ISSN: 2735-590X
Menoufia University, Shibin El Kom, Egypt
https://mkas.journals.ekb.eg

Menoufia University

Nutrition and Food Sciences

Effect of Intake of Garcinia Cambogia Peels on Induced-Obesity Rats

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Abstract:

This study aimed to investigate the effect of Garcinia cambogia (G.C.) peels powder and extract (GCE) on obese rats. Thirty male adult albino rats (weighting 140 ±10 g) were divided into two main groups, the first (5 rats) functioning as a negative control. The second major group (25 rats) fed on a high-fat diet (20% animal fat) for 28 days to produce obesity, after which they were divided into five groups (5 rats each), one of which was kept as a positive control group, while the other four were given G.C. powder 0.5%, G.C. powder 1%, G.C. powder 1.5% and GCE (250 mg\kg). At the end of the experiment period of 28 days, body weight gain, feed intake and feed efficiency ratio were evaluated. Also, blood samples were analyzed for determination of serum liver enzymes (AST, ALT & ALP), serum lipid profile (T.G., T.C, LDL-c, HDL-c &VLDL-c), and kidney functions (uric acid, urea & creatinine). Obesity led to a significant ($P \leq 0.05$) increase in BWG, F.I., FER, T.C., T.G., VLDL, LDL, uric acid, urea, creatinine, AST, ALT, ALP and glucose, while a significant ($P \leq 0.05$) decrease in HDL. Feeding on G.C. powder and extract reversed this effect. Finally, results indicated that the best group was recorded for (G5) (1.5% G.C.) and (G6) (250mg\kg GCE). Therefore, it is recommended to use them as effective treatments in reducing the accumulation of harmful fat in the body and reducing weight.

Keywords*: Garcinia cambogia, Hydroxy-citric Acid (HCA), Plant peels, Biochemical analysis, Weight loss.*

Introduction

Obesity is generally accepted as a worldwide epidemic with troublesome consequences. A trend of increasing prevalence of obesity and obesity-related co-morbidity and mortality was observed over the last few decades. Obesity is considered when there is an excess accumulation of fat in the subcutaneous tissue and the other parts of the body (1). The treatment of the over-weight and the obesity involves mainly aimed participation to

educate the subject on one correct feeding: irregular and hasty meals, irregular and hasty meals, carbohydrate meal outside rich, alcoholic drinks are the root causes of rebelling of the obesity; if to the one join to a sedentary activity and a stressed way of life, phrenetic, little relaxing, the typical picture of the subject is obtained overweight (2).

Garcinia cambogia belongs to family Clusiaceae popularly known as vrikshamala. The plants have been used in Hindu medicines from very early times. The main constituent present in the fruit is especially from its rind, GC are rich in poly isoprenylated benzophenone derivatives such as garcinol and its colorless isomer iso-garcinol. The rind also has lactones, citric acid and oxalic acid. The fruit of GC contains other compounds including malic acid, polyphenols, carbohydrates, anthocyanin, pigments and ascorbic acid (3). Garcinia has also been used routinely for many centuries with no know toxicity. The fruit extract seems to have inhibitory lipogenic properties, which means an ability to prevent production of fat. This extract reduces appetite and to increase the energy level. Garcinia has garnered a lot of attention as a popular natural weight loss could be the reason for its substance called hydroxy-citric acid (HCA) (4). HCA the main acid in fruit and rind suppresses de novo fatty acid synthesis by inhibiting this enzyme and increases the rates of hepatic glycogen synthesis. Hydroxy-citric acid also decreases the hyperglycemic and hyperinsulinemia responses to oral or intra-gastric glucose loads. Studies reported that substances that block the fatty acid synthesis might be useful to prevent the body weight gain because weight gain in adults, and in particular weight regain after the body weight loss, usually comprises a buildup of fat. HCA may be most effective in decreasing the food intake and preventing the body weight gain when the energy intake exceeds energy expenditure and the fatty acid synthesis is increased (5).

Although , there are a huge studies explains the treatment of obesity by chemical compounds but such treatment still an issue for its side effect there for the present study tries to study natural plants such as Garcinia cambogia. Also, this present study aims to inspect the effect of Garcinia cambogia peels fruit as powder and its extract on biological and biochemical changes of obese male albino rats.

Materials and methods:

Plant materials:

GC fruit was obtained from hyper market, Cairo, Egypt. GC peels were sun- dried for three days and ground into fine powder by using a mill (6). Soaked 10g of the powder in 90 ml of ethanol alcohol (80%), shaken for 10 minutes and then leave at room temperature for 72 hours. The mixture was then filtered using a filter paper and the filtrate evaporated to dryness on water bath at 60ºC. The ethanolic extract was kept in airtight bottle in a refrigerator at 4°C until use (7).

Basal diet:

Casein, vitamins, minerals, cellulose, choline chloride, methionine, ethylene glycol, and ammonium chloride were obtained from El-Gomhoryia Company for Trading Drugs and Medical Instruments. The basal diet was prepared according to AIN (8). The component of the vitamin mixture and salt mixture has been formulated in accordance with A.O.A.C(9).

Rats:

This work carried out at Faculty of Home Economic, Menoufia University, Egypt. Thirty adult male albino rats, weighting 140±10 g, were kept in wire cages in a typical laboratory setting. To reduce feed loss and contamination, the meals were given to rats in special feed containers. Rats were also given water via a glass tube that protruded through wire cages from inverted bottles on one side of the cage. The food and water provided were inspected daily.

Induction of obesity in rats:

To obtain obese rats fed on the basal diet added to it saturated fat (sheep tail fat 20%) in 28 days (10). Animal fats were obtained from a butchery in Shebin El-Kom. To ensure that rats are obese, fasting blood samples were obtained by retro orbital method and analyzed.

Experimental design:

The first main group (5rats): feed on standard diet as control negative group (c-ve).

The second main group (25 rats): In this group, rats were induced by fed on a concentration of 20% (sheep tail fat) added to basal diet for 28 days. After confirming that the rats were infected with obesity, this group was subdivided into 5 subgroups (each 5 rats) to feed on the experimental diets for (4) weeks according to the following:

Group (2): Obese rats fed on basal diet (untreated group) as a control positive group (c+ve).

Group (3): Obese rats fed on GC powder by 0.5% diet.

Group (4): Obese rats fed on GC powder by 1% diet.

Group (5): Obese rats fed on GC powder by 1.5% diet.

Group (6): Obese rats fed on basal diet and GC alcoholic extract (GCE) by 250mg/kg body weight per day orally.

Biological evaluation

During the experimental period (28days), the consumed diet was daily recorded (feed intake), biological evaluation of the different diets was carried out by determination of body weight gain (BWG) and feed efficiency ratio (FER) according to Chapman et al. (11). Using the following equations:

$$BWG(g/d/r) = \text{Final weight - Initial weight } /28$$

$$FER = \frac{\text{Body weight gain (g/d/r)}}{\text{Feed intake (g /d/r)}}$$

Blood samples were collected after 12 hours fasting at the end of the experiment from the portal vein into dry clean centrifuge tubes for serum separation, blood samples centrifuged for 10 minutes at 3000 rpm to separate the serum according to Drury and Wallington (12).

Biochemical analysis:

Total cholesterol, triglycerides and HDL were determined according to Allain (13), Fossati and Prencipe (14) and Lopez (15) respectively, determination of LDL and VLDL was carried out according to the method of Lee and Nieman (16).

Alkaline phosphates (ALP), aspartate amino transferees (AST)and alanine amino transferees (ALT) were determined as U/L according to the methods described by Belfield and Goldberg (17), Tietz (18) and Yound (19), respectively. Quantitively determination of glucose was carried out according to the method of Young (20). Serum urea, creatinine and uric acid were determined by enzymatic method according to Patton and Crouch (21), Henry (22) and Schultz (23). respectively.

Statistical Analysis:

The data were statistically analyzed using a computerized program by one-way ANOVA. The results are presented as mean ± SD. Differences between treatments at $P \leq 0.05$ were considered significant (24).

Conflict of interest

The authors state that the publishing of this work does not create a conflict of interest for them. This article is based on Master's thesis that was submitted to Menoufia University's Department of Nutrition and Food Science, Faculty of Home Economics, Shebin El-Kom, Egypt.

Results and discussion

The data of body weight gain (BWG) (g/d/r) in table (1) illustrated that there were significant increase ($P \leq 0.05$) of control (+ ve) group compared to control (- ve) group (0.899±0.029 and 0.361±0.024(g/d/r)) respectively. (G5) GC powder (1.5%) and (G6) (GCE 250 mg/kg) groups have non-significant decrease as compared to control(+ve) group -0.359±0.011(g\d\r) and -0.391±0.022(g\d\r) respectively. In similar studies, Liu et al. (25) reported that GC extracts could significantly reduce body weight gain. Recently, Altiner et al. (26) found that Hydroxy-citric acid that suppresses de novo fatty acid synthesis by inhibiting this enzyme, Studies reported that substances that block the fatty acid synthesis might be useful to prevent the body weight gain because weight gain in adults, and in particular weight regain after the body weight loss, usually comprises a buildup of fat. Researchers emphasized that hydroxy-citric acid may be most effective in

decreasing the food intake and preventing the body weight gain when the energy intake exceeds energy expenditure and the fatty acid synthesis is increased. Recently, Maia et al. (27) found that treatment with GC reduced weight, visceral fat, fat mass and increased metabolic basal rate. Results for FI (m± SD) recorded of significant increase of control (+ve) 28.83±0.135 (g/d/r) when compared to control (-ve) 21.314±0.234 (g\d/r). Rats received supplemented diet of GC powder (0.5, 1 and 1.5%) and GCE (250mg/kg) showed significant decrease ($P \leq 0.05$) in FI being (26.997±0.207, 26.936±0.194, 25.501±0.182 and 25.519±0.245 (g\d/r)) respectively, when compared with control positive group. These results agree with those of Srivastava (28) indicated that FI was decreased as a result of GC fruits containing HCA supplementation at various levels to rat's diet. In the same table (1). Results for feed efficiency ratio (FER) (m± SD) recorded of significant increase of control (+ve) 0.031±0.001 when compared to control (-ve) 0.017±0.001. All treated groups of GC powder (0.5, 1, 1.5%) and GCE (250mg/kg) have significant FER decrease ($P \leq 0.05$) (-0.007±0.002, -0.01±0.002, -0.014±0.0003 and -0.015±0.001) respectively, when compared with control (+ve) group. From results of table (1) the best treatment for BWG, FI & FER was recorded for (G6) (GCE 250mg\kg) compared with control (+ve) group.

Table (1): Effect of GC powder and GCE on BWG, FI and FER of obese

Variables	Negative control	Obese groups					LSD
		Positive	GC 0.5%	GC 1%	GC 1.5%	GCE 250mg\kg	
BWG (g/d/r)	0.36b ± 0.02	0.899a±0.03	-0.187c±0.05	-0.27d±0.04	-0.36e±0.01	-0.39e±0.02	0.0575
FI (g/d/r)	21.314d±0.23	28.83a±0.13	26.99b±0.21	26.93b ±0.19	25.50c ±0.18	25.52c ±0.24	0.361
FER	0.017b ±0.00	0.031a±0.00	-0.00c ±0.00	-0.01d ±0.00	-0.01e ±0.00	-0.015e ±0.00	0.0024

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group.*

As for glucose, data in table (2) indicated that there was significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, it was being (167.5±1.06 and 100.02±2.8 (mg/dl)) respectively. (G4) (GC 1%) and (G5) (GC 1.5%) groups have non-significant decrease the values were (114.25±1.4 and 110.7±2.3 (mg/dl)) respectively. The best serum glucose was recorded for (G6) (GCE 250mg\kg) when compared to control (+ve) group. The present study is in agrees with Liu et al. (25) who reported that GC extracts could significantly reduce serum glucose in rats under high-fat diet. Maia et al. (27) reported that the treatment with GC reducing levels of glucose.

Table (2): Effect of GC powder and GCE on serum fasting blood glucose level of obese rats

Groups		Serum glucose (mg/dl) Mean ± SD
Negative control		100.02 e ± 2.8
Obese groups	Positive	167.5 a ± 1.06
	GC 0.5%	119.13 b ± 1.39
	GC 1%	114.25 c ± 1.4
	GC 1.5%	110.7 c ± 2.3
	GCE 250mg\kg	106.03 d ± 2.4
LSD		3.551

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group.*

Table (3) showed the Effect of GC powder and GCE on (TG) and (TC) of obese rats.
Data presented in table (3) illustrated that the mean value of (TC) have significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 99.23±1.02 and 70.01±1.1(mg/dl) respectively. (G5) (GC 0.5%) and (G6) (GCE 250mg\kg) groups have non- significant decrease as compared to control (+ve) being 69.22±1.5 and 68.15±1.25(mg/dl). The best serum (TC) level was showed for (G6) (GCE 250 mg\kg) when compared to control (+ve) group. As for (TG), the results in same table (3) revealed that the mean value of (TG) have significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 95.35±1.12 and 45.06±1.05(mg/dl) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant decrease ($P \leq 0.05$) in (TG) (59.8±1.09, 52.15±1.1, 45.19±1.15 and 41.29±1.2(mg/dl)) respectively, when compared to control (+ve) group. The best serum (TG) level was showed for (G6) (GCE 250 mg\kg) when compared to control (+) group. Mahmoud and Amer (29) indicted that oral administration of GC / Hydroxy-citric acid induced reduction in TC and TG in treated rats. Father more Ferrara (30) explain that Hydroxy-citric acid (HCA) present in G. cambogia is a potent and competent inhibitor of adenosine-triphosphate (ATP) citrate lyase, which is a key enzyme in the synthesis of fatty acids, cholesterol, and triglycerides. El-shaer et al. (31) reported that feeding of high fat diet caused a significant increase in (TC and TG) levels on rats. Maia et al. (27) found that the treatment with GC reducing levels of TG and TC.
Data presented in table (4) observed that the mean value of (VLDL) have significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 19.07±0.224 and 9.012±0.21(mg/dl) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant decrease ($P \leq 0.05$) in (VLDL) (11.96±0.218, 10.43±0.22, 9.038±0.23 and 8.258±0.24(mg/dl))

respectively, when compared to control (+ve) group. The best serum (VLDL) was shown for (G6) (GCE 250 mg\kg) when compared to control (+ve) group. As for (LDL), it could be revealed that the mean value of (LDL) have significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 60.02±0.186 and 24.918±0.19(mg/dl) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant decrease ($P \leq 0.05$) in (LDL) (39.61±0.232, 35.01±0.23, 26.952±0.82 and 24.781±0.46(mg/dl)) respectively, when compared to control (+ve) group. The best serum (LDL) was shown for (G6) (GCE 250 mg\kg) when compared to control (+ve) group. The same table (4) indicated that the mean value of (HDL) have significant increase ($P \leq 0.05$) of control (-ve) group compared to control (+ve) group, being 36.08±0.7 and 20.14±0.61(mg/dl) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant increase ($P \leq 0.05$) in (HDL) (28.83±0.25, 30.71±0.39, 33.23±0.45 and 35.11±0.55(mg/dl)) respectively, when compared to control (+ve) group. The best serum (HDL) was shown for (G3) (GC 0.5%) when compared to control (+ve) group.

Similar studies indicated that GC produced significant reductions in serum level of (LDL) and (VLDL) in hyper-lipidemic rats (32). Farther more Khater et al. (33) reported that (LDL) and (VLDL) of obese rats recorded the highest values when compared with control group.**Table (3): Effect of GC powder and GCE on serum TC and TG level of obese rats**

Variables	Negative control	Obese groups					LSD
		Positive	GC 0.5%	GC 1%	GC 1.5%	GCE 250mg\kg	
T.C (mg/dl)	70.01d±1.1	99.23a±1.02	80.4b±0.7	76.15c±0.84	69.22d±1.5	68.15d±1.25	1.957
T.G (mg/dl)	45.06d±1.05	95.35a±1.12	59.8b±1.09	52.15c±1.1	45.19d±1.15	41.29e±1.2	1.991

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group.*

Results from table (5) showed that control (-ve) group had lower ($P \leq 0.05$) values of (AST, ALT and ALP) than obesity groups. These results are agreeing with Kassab et al. (34) who reported that (AST, ALT and ALP) values of obese rats were higher when compared to control group. The data of (AST) illustrated that the mean value of (AST) have significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 70.11±1.25 and 39.07±1.07(u/l) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) showed significant increase ($P \leq 0.05$) in (AST) (57.3±1.31, 62.04±0.96 and 66.5±1.41 (u/l)) respectively, when compared to control

(+ve) group. The highest decrease limit of (AST) recorded for (G3) (GC 0.5%) being 57.3 ±1.31(u/l). Although (G6) recorded a non-significant difference (AST) with the control (+ve) group, but it decreases the results compared to positive control group. As for (ALT) data in the same table (5) illustrated that the mean value of (ALT) have a significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 64.8±0.65 and 30.06±1.5(u/l) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant increase ($P \leq 0.05$) in (ALT) (47.16±0.6, 54.32±0.75, 59.02±1.01 and 62.3±1.02 (u/l)) respectively, when compared to control (+ve) group. The highest decrease limit of (ALT) recorded for (G3) (GC 0.5%) being 47.16 ±0.6(u/l). In relation of (ALP) data illustrated that the mean value of (ALP) have a significant increase ($P \leq 0.05$) of control (+ve) group compared to control (-ve) group, being 100.3±0.7 and 69.5±1.1(u/l) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed a significant increase ($P \leq 0.05$) in (ALP) (84.21±0.85, 88.23±1.09, 94.09±1.24 and 96.03±1.35(u/l)) respectively, when compared to control (+ve) group. The highest decrease limit of (ALP) recorded for (G3) (GC 0.5%) being 84.21 ±0.85(u/l). GC and GCE reduce serum (AST, ALT and ALP) of obesity rats compared with control (+ve) group. These results seemed to agree with Ateş et al. (35) who indicted that GCE decreased AST e and ALP in rats fed high-lipid diet.

Table (4): Effect of GC powder and GCE on (LDL, HDL and VLDL) levels of obese rats

Variables	Obese groups						
	Negative Control	**Positive**	**GC 0.5%**	**GC 1%**	**GC 1.5%**	**GCE 250mg\kg**	LSD
VLDL (mg/dl)	9.012d±0.21	19.07a±0.22	11.96b±0.218	10.43c±0.22	9.038d±0.23	8.26e±0.24	0.398
HDL (mg/dl)	36.08a±0.7	20.14f±0.61	28.83e±0.25	30.71d±0.39	33.23c±0.45	35.1b±0.55	0.913
LDL (mg/dl)	24.92e±0.19	60.02a±0.19	39.61b±0.232	35.01c±0.23	26.95d±0.82	24.78e±0.46	0.749

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group. HDL = High density lipoprotein. LDL = Low density lipoprotein. VLDL = Very low density lipoprotein.*

The data from table (6) showed that the mean value of uric acid have significant increase ($P \leq 0.05$) of control (+ve) group compared control (-ve) group, being 2.91±0.22 and 0.64±0.04 (mg/dl) respectively. There was non-significant difference between the groups (G3, G4 and G5) the values were (1.24±0.15, 1.19± 0.09 and 1.08± 0.11(mg\dl)). (G6) GCE (250mg\kg) recorded the best result as compared to control (+ve) group. Also data

from the same table (6) indicated that the mean value of urea have significant increase (P ≤ 0.05) of control (+ve) group compared control (-ve) group, the values were 47.14± 1.29 and 25.5± 0.24 (mg\dl)) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant decrease (P ≤ 0.05) in urea (37.21±0.38, 34.71±0.72, 30.01±0.53 and 29.08±0.35(mg\dl)) respectively, when compared to control (+ve) group. The highest value urea of treated group recorded for (G3) GC (0.5%), but the lowest value recorded for (G6) GCE (250mg\kg). Results from the same table (6) illustrated that the mean value of creatinine have significant increase (P ≤ 0.05) of control (+ve) group compared control (-ve) group, the values were 0.98± 0.03 and 0.52± 0.02 (mg\dl)) respectively. Rats received supplemented diets of GC powder (0.5, 1 and 1.5%) and GCE (250mg\kg) showed significant decrease (P ≤ 0.05) in creatinine (0.8±0.03, 0.73±0.01, 0.64±0.04 and 0.61±0.02(mg\dl)) respectively, when compared to control (+ve) group. The highest value creatinine of treated group recorded for (G3) GC (0.5%) which recorded 0.8±0.03, but the lowest value recorded for (G6) GCE (250mg\kg) which recorded 0.61±0.02. From this results the best treatment for urea, creatinine and uric acid was recorded for (G6) GCE (250mg\kg) when compared with control (+ve) group. Thes results agree with Amin et al. (36) who investigated that Garcinia produce significant decrease in serum urea and creatinine in rats fed a diet with HFD. Also, Fan et al. (37) reported that hydroxyl-citric acid (HCA)the major component of Garcinia cambogia extract, induces dissolution of the calcium oxalate crystal in vitro, suggesting that clinical grade G. cambogia has the potential to treat calcium oxalate kidney stone. In this study, we used the Drosophila genetic and non-genetic nephrolithiasis model to evaluate the effect of G. cambogia and HCA on the prevention and removal of calcium oxalate.

Table (5): Effect of GC powder and GCE on serum liver enzymes (AST, ALT & ALP) of obese rats

Variables	Negative control	Obese groups					LSD
		Positive	GC 0.5%	GC 1%	GC 1.5%	GCE 250mg\kg	
AST (U/L)	39.07e±1.07	70.11a±1.25	57.3d±1.31	62.04c±0.96	66.5b±1.41	68.9a±0.98	2.092
ALT (U/L)	30.06f±1.5	64.8a±0.65	47.16e±0.6	54.32d±0.75	59.02c±1.01	62.3b±1.02	1.727
ALP (U/L)	69.5f±1.1	100.3a±0.7	84.21e±0.85	88.23d±1.09	94.09c±1.24	96.03b±1.35	1.918

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group.*

Table (6): Effect of GC powder and GCE on kidney functions (uric acid, urea and creatinine) (mg\dl)) of obese rats

Variables	Obese groups	LSD

	Negative control	Positive	GC 0.5%	GC 1%	GC 1.5%	GCE 250mg\kg	
Uric acid (mg/dl)	0.64d±0.04	2.91a±0.22	1.24b±0.15	1.19bc±0.09	1.08bc±0.11	0.92c±0.1	0.233
Urea (mg/dl)	25.5e±0.24	47.14a±1.29	37.21b±0.38	34.71c±0.72	30.01d±0.53	29.08d±0.35	1.213
Creatinine (mg/dl)	0.52e±0.02	0.98a±0.03	0.8b±0.03	0.73c±0.01	0.64d±0.04	0.61d±0.02	0.048

Means with the different superscript letters in the same column were significant different at (P<0.05). LSD: Least significant differences (P<0.05).%Change of (+ve) control group.*

Conclusion

HCA the active constituent in Garcinia and is gaining a reputation for assisting weight loss through appetite suppression and by reducing the body's ability to form adipose (fatty) tissue during times of overeating .So, GC powder and GCE which selected in this study were effective in protecting from obesity. Therefore, the data recommended the use of the specified powder in a moderate amount to be included in our daily diets or drinks.

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تأثير تناول قشور ثمار الجارسينيا كامبوجيا على الفئران المصابة بالسمنة

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الملخص العربي

تهدف هذه الدراسة الى معرفة تأثير مسحوق ومستخلص قشور الجارسينيا كامبوجيا على الفئران المصابة بالسمنة. تم تقسيم ثلاثين فأرًا بالغًا من الفئران البيضاء، وزنها 140±10جم إلى مجموعتين رئيسيتين المجموعة الاولى (5 فئران) وهى المجموعة الضابطة السالبة. المجموعة الثانية (25 فأر) تم تغذيتها على نظام غذائي عالي الدهون (20٪ دهون حيوانية) لمدة 28 يوما لإحداث الاصابة بالسمنة، بعد ذلك ثم تقسيمها إلى 5 مجموعات (5 فئران في كل مجموعة) واحدة منهم تركت كمجموعة ضابطة موجبة، وأربع مجموعات أخرى تم اعطائهم مسحوق (الجارسينيا) بنسبة 0.5٪ , 1٪ و 1.5%ومستخلص كحولي للجارسينيا بنسبة 250 مل لكل كجم لمدة 28 يوم, وفى نهاية التجربة تم تقييم وزن الجسم المكتسب والمأخوذ الغذائي ومعدل الاستفادة من الغذاء كما تم تحليل عينات الدم لتحديد إنزيمات الكبد (الجلوتاميك أوكساليك ترانس أمينيز و الجلوتاميك بيروفيك ترانس أمينيز و الألكالين فوسفاتيز) وتحليل نسبة الدهون في الدم (الدهون الثلاثية , والكوليسترول الكلى و الليبوبروتينات عالية الكثافة و الليبوبروتينات المنخفضة الكثافة و الليبوبروتينات منخفضة الكثافة جدا)، وظائف الكلى (حمض البوليك ، اليوريا والكرياتينين). أدت السمنة إلى زيادة معنوية (P 0.05) في وزن الجسم المكتسب والمأخوذ الغذائي ومعدل الاستفادة من الغذاء والدهون الثلاثية , والكوليسترول الكلى و الليبوبروتينات المنخفضة الكثافة و الليبوبروتينات منخفضة الكثافة جدا وحمض البوليك واليوريا والكرياتينين و الجلوتاميك أوكساليك ترانس أمينيز و الجلوتاميك بيرو فيك ترانس أمينيز و الألكالين فوسفاتيز والجلوكوز ، في حين أن هناك انخفاض معنوي P) (0.05في الليبوبروتينات عالية الكثافة .التغذية على مسحوق ومستخلص الجارسينيا عكس هذا التأثير. أظهرت النتائج أن أفضل مجموعة سجلت للمجموعة (5) (1.5٪ مسحوق الجارسينيا) والمجموعة (6) (250 مل / كجم مستخلص كحولي). لذلك يوصى باستخدامها كأغذية فعالة في تقليل تراكم الدهون الضارة في الجسم وتقليل الوزن.

الكلمات المفتاحية: جارسينيا كامبوجيا, حمض الهيدوكسي سيتريك، القشور النباتية، الفئران، التحليل البيوكيميائى، انقاص الوزن.