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Effects of the Anti-obesity Drugs Vita Slim and Green Tea on Certain Biochemical and Physiological Indices of Obese Adult Male Albino Rats

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ABSTRACT

Background: Because obesity is linked to an increased risk of diabetes and heart disease, the ideal anti-obesity medication would have weight loss that was long-lasting and had few side effects.

Objective: To detect if the weight-loss drugs; green tea and Vita slim negatively affect several biochemical and physiological markers.

Materials and Methods: Three groups consisted of 21 mature obese male albino rats (with a body weight of 220 ±20 gram): In Group one: control (vehicle treatment), in group two: for a period of 30 days, rats were given Vita slim (0.1mg/kg/day), and in group three: for 30 days, rats were given green tea (0.1 mg/kg/day).

Results: Significant changes were observed in the weight of the treated groups, in serum levels of AST/ALT, albumin, triglycerides, low-density lipoproteins (LDL), LDL/HDL ratio, urea, creatinine, as well as triiodothyronine (T3) as compared with the control group.

Conclusion: Several physiological and biochemical markers, including kidney and liver functions, have been shown to be negatively impacted by Vita slim and green tea after 30 days of ingestion.

Keywords: Anti-obesity drugs, Green tea, Hormones, Kidney functions, Lipid profile, Liver functions, Vita slim.

INTRODUCTION

A larger number and larger size of fat cells characterize as obesity, a condition that has a detrimental effect on one's health. Adipocytes in a person's fat tissue expand first in size, then in number, as weight is added to the body; conversely, as weight is reduced, adipocytes retract in size but not in number. Adipocytes are the fat cells found in the body of a person [(1)]. Obesity is primarily caused by a deficit in energy expenditure relative to calorie intake [(2)]. As a result, there are a variety of other factors, including environmental (e.g., diet, lifestyle, lack of physical activity, and some medicine), as well as genetic (e.g., predispositions inheritance to weight gain). Obesity, on the other hand, is often blamed on a poor diet and an unhealthy lifestyle [(3)]. Overproduction of preadipocytes and differentiation into mature adipocytes are two important steps in obesity development [(4)].

Vita slim drug is composed from natural products. The formula of Vita slim contains many natural ingredients, which is clinically proven to lose weight by suppressing appetite and accelerating burning, and the most prominent components of the following: *Garcinia camuglia*, Gymnema herb, chromium, sweet potato fibres, green coffee extract and green tea extract[(5)].

Green tea may have a significant impact on body composition because of catechins, according to some researchers [(6)]. Caffeine is also found in green tea, which has catechins. Camellia sinensis leaves are used to make green tea, which contains catechins, like epigallocatechin-3-gallate [(7)]. Along with quercetin, theaflavins, thearubigins, theaflavinol, caffeine gallic acid, as well as chlorogenic acid [(8)]. Green tea's weight-loss properties have been attributed to a variety of factors. Reduce food intake, interrupt lipid emulsification and absorption, decrease adipogenesis and the formation of fat, and increase energy expenditure *via* thermogenesis (fat burning), fat oxidation (fat burning), and fecal lipid excretion (fat excretion) [(9)].

This study aims to compare between two slimming drugs: Vita slim and green tea. Also, to explore the various effects of both on some physiological indices of obese adult male rats.

MATERIALS AND METHODS

Experimental animals

This study utilized a total of twenty-one albino male rats (220±20 g). Rats were purchased from animal unit of the Nile Pharmaceutical Company, Cairo, Egypt. They were housed in a room with controlled circumstances in well-aerated polypropylene clear cages (average dimensions 50 x 30 x 25 cm) .We put 7 rats in each cage. Temperature ranges from 25 plus or minus 2°C, humidity of 55 ±5 percent, and a 12-hour light/dark cycle. Two weeks before the experiment, they were freely fed and watered, allowing them to adapt and detect any signs of pathological features.

Ethical approval

To ensure that all experiments were conducted in accordance with Al-Azhar University's Faculty of Science, Cairo, Egypt's "Ethics Committee for the Faculty of Science," Cairo, Egypt's, and "Guide for the Care and Use of Laboratory Animals" (NIH publication No. 85–23, 1996).

Drugs and chemicals

Med Care for Pharma Clinic, Egypt provided Vita slim pills (400 mg/capsule). In addition, green tea (in capsules form) was obtained Herbal company , Australia (400 mg /capsule).

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Design of the study

The average weight of the rats used in this experiment was 220 plus or minus 20 g, they were divided into three groups of seven animals, as follows:

Group one (control group) rats received daily deionized distilled water.

Group two (Vita slim group): For 30 days, Vita slim was administered orally by gavage to each rat at a dose of 0.1 mg/kg/12 hours.

Group three (green tea group) rats were administered green tea orally by gavage at the dose of 0.1 mg/kg/12 hours for 30 days.

Both green tea and Vita slim were dissolved in distilled water before use.

Body weight (BW) evaluation

A preliminary and final weighing was performed on the animals. The following calculation was employed to get the percent change in weight:

BW change percentage = Final BW – Initial BW/Initial BW multiplied by 100

Collection of blood samples

At the end of the treatment, the animals were starved overnight and then anaesthetized with a light pentobarbitone anesthesia. Blood samples were collected from the retro-orbital venous plexus using capillary tubes. After centrifuging the blood for 10 minutes at 5000 revolutions per minute, the separated serum was preserved in an Eppendorf tube and refrigerated at -20 degrees Celsius until analysis was done.

Measurement of serum biomarker

Glucose and insulin

An enzyme-linked immunosorbent assay (ELISA) kit (U.E. Type) was used to quantify rat insulin quickly and accurately (Biovendor Research and Diagnostic product reff. (Czech republic) glucose level was measure by using BioMerieux kit. An online calculator was utilized to estimate HOMA-IR (Homeostatic Model Assessment of Insulin Resistance) by the Diabetes Trail Unit, University of Oxford, Oxford, United Kingdom [(10)].

HOMA-IR= Fasting serum insulin (μIU/ml) × Fasting serum glucose (mmol/L) / 22.5

Protein profile

This method was used to compute the serum globulin concentration using the BioMerieux kits which were used to measure total protein and albumin concentrations:

Globulin (g/dl) = Total protein (g/dl) –albumin (g/dl).

Lipid profile

This study was conducted utilizing BioMerieux kits for the measurement of total cholesterol, total triglycerides, and high-density lipoprotein cholesterol. While LDL and VLDL cholesterol were calculated using Friedwald and Norbert's (Friedewald and Norbert) equations, respectively (VLDL). The TC/HDL (risk factor 1) and LDL/HDL (risk factor 2) ratios were obtained after measuring serum LDL-C and VLDL.

Friedewald's equation: LDL-C (mg/dl) = TC- {HDL + [TG/5]}.

Norbert equation: VLDL = TG/5.

Liver function enzymes

Colorimetric assay kits (BioMerieux) were used for determining aspartate aminotransferase (AST) and alanine aminotransferase (ALT).

Kidney function enzymes

Renal function biomarkers were assessed through determination of serum creatinine and urea concentration by using BioMerieux kits.

T3, T4, leptin and testosterone

ELISA kits from Abcam were used to estimate testosterone, T3, and T4 levels, while an ELISA kit from (E0561Ra, Bioassay technology laboratory) was used to determine blood leptin.

Statistical analysis

Each set of seven rats was represented as a mean standard deviation (SD) of the biochemical data. The SPSS (Statistics Package for the Social Sciences) statistical software version v 19.1 was used to analyses the statistical differences between the control and test groups. A t-test was used to compare the two groups of normally distributed variables. P value 0.05 was considered statistically significant. It was judged highly significant when the P value was 0.001.

RESULTS

In terms of body weight, when Vita slim and green tea were administrated to animals, there was no difference in the percentage change in body weight between the two groups, but there was a significant decrease after 15 days when the test animals were compared to the control group. After 30 days, however, the change in body weight as a percentage dropped dramatically compared to control group (Table 1).

Table (1): Percentage body weight change of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Body weight change (15 days)	15.06 ± 2.38	9.33 ± 12.13 *	13.34 ± 7.49
% Change compared to control		-38.07%	28.43%
Body weight change (30 days)	62.40 ± 7.91	15.53 ± 18.00 **	30.53 ± 23.06 **
% Change compared to control		-75.12%	-51.08%

Values are means ± SD of seven rats in each group. * P<0.05, ** P<0.01 in comparison to control group.

Control and treatment groups had similar amounts of blood glucose and insulin. Comparing the Vita slim and green tea groups to the controls, no differences in glycemic indices were seen (**Table 2).**

Table (2): Pancreatic function of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Glucose (mg/dl)	102.60±4.67	104.60 ± 13.96	104.80 ± 22.86
% Change compared to control		1.95%	1.96%
Insulin (mu/ml)	0.93±0.03	0.98 ± 0.03	0.95 ± 0.02
% Change compared to control		4.50%	1.93%
HOMA-IR	0.24±0.03	0.26 ± 0.01	0.25 ± 0.01
% Change compared to control		7.38%	4.10%

Values are means ± SD of seven rats in each group.
HOMA-IR: The Homeostatic Model Assessment of Insulin Resistance

Rats treated with Vita slim and green tea capsules exhibited an extremely substantial increase in both AST and ALT activity compared to the control **(Table 3)**.

Table (3): Liver function enzymes of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
AST (U/L)	74.80±10.76	96.60 ± 5.77 **	93.00 ± 9.46 **
% Change compared to control		29.14%	24.33%
ALT(U/L)	27.20±2.59	44.40 ± 4.56 **	43.60 ± 4.64 **
%Change compared to control		63.24%	60.29%

Values are means ± SD of seven rats in each group.
** P<0.01 in comparison to control group. AST: Aspartate transferase, ALT: Alanine transferase.

A/G ratio and albumin dropped significantly, while globulin increased dramatically in the Vita slim and green tea-treated rats as compared to the control group **(Table 4).**

Table (4): Protein profile of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Total protein (g/dl)	6.38±0.22	6.99 ± 0.55	6.80 ± 0.69
% Change compared to control		9.59%	6.58%
Albumin (g/dl)	3.14±0.15	3.00 ± 0.29	2.90 ± 0.27
% Change compared to control		-4.46%	-7.64%
Globulin (g/dl)	3.24±0.19	3.97 ± 0.38 *	3.90 ± 0.45 *
% Change compared to control		22.59%	20.37%
A/G	0.97±0.09	0.76 ± 0.09 **	0.75 ± 0.05 **
% Change compared to control		-21.49%	-22.93%

Values are means ± SD of seven rats in each group.
* P<0.05, ** P<0.01 in comparison to control group. A/G: Albumin/Globulin ratio.

There was a significant decrease in the serum triglyceride and LDL levels of rats administered Vita slim and green tea compared with the control group. The Vita slim group revealed a decrease in LDL compared to the control group **(Table 5).**

Table (5): Lipid profile of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Total cholesterol (mg/dl)	86.40±3.78	85.1 ± 5.43	83.30 ± 5.99
% Change		-1.5%	-3.58%
Triglycerides (mg/dl)	135±9.7	120.1 ± 10.13 *	119.02 ± 8.18 *
% Change		-11.03%	-11.83%
HDL-C (mg/dl)	52.60±6.58	48.00 ± 4.12	49.00 ± 3.44
% Change		-8.7%	-6.8%
LDL-C(mg/dl)	13.64±2.41	10.99±1.68*	10.02±2.76*
% Change		-19.43%	-26.53%
VLDL-C (mg/dl)	27±0.1	25.6±0.9	24±1.55
% Change		-5%	-11%
TC/HDL	1.68±0.20	1.6 ±0.15	1.61 ± 0.16
% Change		-4.8%	-4.5%
LDL/HDL	0.28±0.03	0.23 ± 0.12	0.26 ± 0.03
% Change		-17.8%	-7.14%

Values are means ± SD of seven rats in each group. * P<0.05 in comparison to control group. HDL-C: High-density lipoprotein cholesterol, LDL-C: Low-density lipoprotein cholesterol, VLDL-C: Very low-density lipoprotein cholesterol.

Vita slim-treated rats had greater urea and creatinine concentrations than the control rats, while green tea-treated rats had lower concentrations than the control rats (**Table 6).**

Table (6): Kidney function enzymes of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Urea (mg/dl)	37.3±0.66	42.4±0.8*	25.80 ± 3.35
% Change compared to control		13.67%	-10.42%
Creatinine (mg/dl)	1.18±0.025	1.4±0.098*	0.41 ± 0.05 **
% Change compared to control		18.64%	-56.29%

Values are means ± SD of seven rats in each group.
* P<0.05, ** P<0.01 in comparison to control group using T-Test.

When compared to the levels of the control, testosterone, T3, and T4 concentrations were considerably significant elevate in the Vita slim group. In contrast to the control value, testosterone levels were lower in the green tea groups as compared with the control group **(Table 7)**.

Table (7): Levels of testosterone, T3, T4 and leptin of control, Vita slim and green tea groups

Parameter	Control	Vita slim	Green tea
Testosterone (ng/dl)	1.03±0.08	1.55 ± 0.52 *	0.5±0.18*
% Change		50.48%	-51.45%
T3 (ng/dl)	47.9±0.6	53±2.1 *	49±23
% Change		10.6%	2.29%
T4 (ng/dl)	3.02±0.01	3.60 ± 0.23 **	2.82 ± 0.58
% Change		19.28%	-6.56%
Leptin (ng/dl)	1.90 ± 0.35	1.80 ± 0.34	2.09 ± 0.22
% Change		-5.26%	10%

Values are means ± SD of seven rats in each group.
* P<0.05, ** P<0.01 in comparison to control group. T3: triiodothyronine, T4: thyroxine.

DISCUSSION

An unhealthy relationship exists between food intake and energy expenditure caused obesity. In terms of chronic disease and disability, obesity is an important risk factor [(11)]. Obesity increases the risk of diabetes, heart disease, hypertension, and certain cancers [(12)]. The purpose of this study was to examine the effects of anti-obesity medications Vita slim and green tea on male albino rats' body weight, as well as its effects on various physiological markers.

The present results denoted that there was a significant reduction in % change of body weight in rats administrated with Vita slim, which contains Garcinia *cambogia*, as the primary ingredient, also contains hydroxycitric acid (HCA), one of the isomers of HCA (structurally connected to citric acid), which is believed to aid in weight loss. Inhibiting citric acid lyase is the mechanism of action, which is important for the formation of fatty acids [(13)].

According to **Kim *et al.* [(13)],** Vita slim's *Garcinia cambogia*, is a popular weight-loss supplement. *Garcinia cambogia* aids in weight loss, suppresses hunger, and increases fullness. It also aids in the maintenance of a healthy weight, as it aids in the burning of body fat. In addition, green tea, which contains the highest amount of catechins, resulted in a significant loss of body weight when consumed. *In vitro* studies have shown that caffeinated beverages, such as red tea, have thermogenic effects and can increase fat oxidation that may aid in the reduction of body weight (fat loss) [(14)].

There was highly increase in liver enzyme in Vita slim-treated group. This may be due to *Garcinia cambogia* found in Vita slim, which revealed its hepatotoxicity effects. As the severity of liver injury increases, the liver enzyme levels elevated; our findings are consistent with those of **Kaswala *et al.*** [(15)].

In 2001, the first report of green tea extract hepatotoxicity was published. After report of liver damage from the dried ethanolic extract of green tea, the product Exolise was taken off from the market. Hepatotoxic effects of Camellia sinensis micronized powder were later reported in the literature. [(16)]. Green tea infusions have also been linked to hepatotoxicity, according to recent studies [(17,18)]. Such a side effect is unknown in terms of its frequency. In most situations, liver poisoning is more prevalent in women, with symptoms ranging from mildly elevated liver enzymes to acute liver failure.

Among our findings the globulin and albumin/globulin in Vita slim have increased significantly due to it contains *Garcinia cambogia* that is the most important supplement induced hepatotoxicity [(19)]. Our study agrees with **Semwal *et al.*** [(20)] who stated that it has potential life-threatening side effects. In Southeast Asia, *Garcinia cambogia* is employed as a culinary ingredient because of its harsh and sour taste. In *Garcinia cambogia*, the most crucial element is HCA. Products containing hydroxycitric acid

were recalled by the Food and Drug Administration after 23 incidents of hepatotoxicity were reported.

Green tea (GT), Camellia sinensis, has been shown to provide a wide range of health benefits, including the management of central nervous system, cardiovascular, and metabolic conditions, as well as the treatment of cancer and inflammatory disorders. Even while the term "natural" is often used as a synonym for safe, this is not always the case. GT has been linked to several negative health outcomes, according to relevant studies. Hepatotoxicity and gastrointestinal problems, especially when taken on an empty stomach, are the most common side effects [(21)]. Hepatotoxic effects of medicines, thus, may have an impact on protein profiles given that the liver is the primary location for protein synthesis.

Vita slim and green tea reduced triglyceride levels significantly in rats. It was shown in animal experiments to reduce cholesterol levels in rats fed a cholesterol-rich diet by decreasing lipogenesis and enhancing lipase activity [(22)].

Roudebush *et al.* [(23)] revealed that *Garcinia cambogia* seeds has erythropoietic and anti-diabetic properties in rats on a high-fat diet.

In this study, the LDL and triglyceride levels were dramatically reduced after intervention with green tea. Green tea and its main ingredients catechins may reduce the absorption of lipids from the diet, which could explain why green tea lowers cholesterol [(24)]. A single dose of green tea extract was found to dramatically reduce the absorption of lipids in research by **Walkowiak *et al.*** [(25)]**.** Using 379 mg of green tea extract, **Sulibursk*a et al.*** [(26)] conducted a study on two groups of obese persons. Antioxidant levels rose significantly along with the lipid-lowering effect, according to the findings of this study.

Compared to the control group, the Vita slim group showed a substantial rise in serum creatinine due to toxic effect of chromium, which is a component of Vita slim on reduced glomerular filtration rate, which can lead to renal dysfunction and elevated levels of creatinine in the blood [(27)]. In addition, chromium 's acute and long-term toxicity has been documented, in a study conducted by **Baruthio**[(28)] who reported toxicological effects of chromium compounds on human health, which were being defined as a result of chronic workplace poisonings caused by ingestion of dust or aerosols, or by direct contact with mucosal membranes.

Researchers found that green tea had a favorable effect on anomalies in plasma BUN and creatinine. The antioxidant and anti-inflammatory benefits of catechins, the main components of green tea extract, have been postulated [(29)]. Glutathione peroxidase, catalase, and superoxide dismutase are just a few of the antioxidant enzymes that green tea extract contains [(30)]. Green tea extract has been shown to be a useful dietary supplement, according to this study. Green tea extracts showed powerful antioxidant and anti-inflammatory capabilities, it lowers BUN and creatinine levels.

There were significant increases of testosterone hormone in Vita slim when compared with the control. *Garcinia cambogia*, the primary ingredient in Vita slim, contains the antioxidants biflavonoid and xanthone, which may explain its effects. Strong antioxidants, these substances can enhance testosterone production. **Akpantah *et al.*** [(31)] has found that *Garcinia cambogia* increases the peripheral testosterone level.

Comparing the green tea-treated groups to their respective control, this experiment indicates a drop in serum testosterone levels. Green tea epigallocatechin gallate has also been linked to a drop in testosterone levels in the blood [(32)]. Due to the decreased activity of steroidogenic enzymes, such as 3 β hydroxyl steroid dehydrogenase and 17 β hydroxyl steroid dehydrogenase, testosterone levels may be lower than normal [(33)]. **Kao *et al.*** [(34)] reported that after drinking green tea, rats revealed reduced testosterone levels in the bloodstream. According to previous research, the polyphenols in green tea are known to decrease testosterone production in Leydig cells through cell signalling pathways, P-450 side chain breakage and the action of 17 β -hydroxyl steroid dehydrogenase, which is also known as epigallocatechin gallate (EGCG) [(35)].

It is proved that thyroid hormones, particularly T3, are important metabolic hormones. Energy generation is linked to the quantity of thyroid hormones in the bloodstream. **Hornick *et al.*** [(36)] found that FT3 was elevated in the 3000 mg/kg (−)-HCA supplemented group. Increasing energy expenditure in rats has been shown to be possible using an extract of HCA from the dried *Garcinia cambogia*, the primary ingredient in Vita slim[(37)].

CONCLUSION

Findings of the current study showed that Vita slim and green tea capsules have a deleterious influence on critical biochemical and physiological markers, notably liver functions.

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REFERENCES

1. **Eckel R (2008):** Nonsurgical management of obesity in adults. N Engl J Med., 358: 1941-50.
2. **Paulen M, Zapata L, Cansino C *et al.* (2010):** Contraceptive use among women with a history of bariatric surgery: a systematic review. Contraception, 82(1): 86-94.
3. **Di Angelantonio E, Bhupathiraju S, Wormser D *et al.* (2016):** Body-mass index and all-cause mortality: individual-participant-data metaanalysis of 239 prospective studies in four continents, Lancet, 388(10046) :776-786.
4. **Marcos A (2015):** The impact of overweight and obesity on adolescence2015: consequences on metabolic biomarkers. J Nutr Sci Vitaminol., 61: 211-15.

5. **https://www.beauty-expert.co/product/%D9%81%D9%8A%D8%AA%D8%A7-%D8%B3%D9%84%D9%8A%D9%85-%D9%84%D9%84%D8%AA%D8%AE%D8%B3%D9%8A%D8%B3**
6. **Bagheri R, Rashidlami A, Ashtary-Larky A *et al.* (2019):** Does green tea extract enhance the anti-inflammatory effects of exercise on fat loss? The Bri Pharmacol Soci., 86:753–762.
7. **Di Lorenzo C, Ceschi A, Kupferschmidt H *et al.* (2015):** Adverse effects of plant food supplements and botanical preparations: a systematic review with critical evaluation of causality. Br J Clin Pharmacol., 79(4):578-592.
8. **Cercato LM, White PA, Nampo F *et al.* (2015):** A systematic review of medicinal plants used for weight loss in Brazil: is there potential for obesity treatment? J Ethnopharmacol., 176: 286-296.
9. **Huang J, Wang Y, Xie Z *et al.* (2014):** The anti-obesity effects of green tea in human intervention and basic molecular studies. Eur J Clin Nutr., 68(10):1075-1087**.**
10. **Matthews D, Hosker J, Rudenski A *et al.* (1985):** Homeostasis model assessment: Insulin resistance and β-cell function from fasting plasma glucose and insulin concentrations in man. Diabetologia, 28: 412–419.
11. **Fujioka K (2002):** Management of obesity as a chronic disease: nonpharmacologic, pharmacologic, and surgical options. Obes Res., 10(2): 116–23.
12. **Unger R (2003):** Lipid overload and overflow: metabolic trauma and the metabolic syndrome. Trends Endocrinol Metab., 14(9):398–403.
13. **Kim Y, Choi M, Park Y *et al.* (2013):** *Garcinia cambogia* attenuates diet-induced adiposity but exacerbates hepatic collagen accumulation and inflammation. World J Gastroenterol., 19(29): 4689-4701.
14. **Hursel R, Westerterp-Plantenga M (2013):** Catechin- and caffeine-rich teas for control of body weight in humans. Am J Clin., 98: 1682–93.
15. **Kaswala D, Shah S, Patel N *et al.* (2014):** Hydroxycut-induced liver toxicity. Annal Med Health Sci Res., 4: 143-145.
16. **López A, Rodríguez L, García-Morán S *et al.* (2004):** Hepatitis aguda asociada a ingestion de Camellia thea y orthosiphon stamineus. Gastroenterol Hepatol., 27: 558-61.
17. **Jimenez-Saenz M, Martinez-Sanchez M (2006):** Acute hepatitis associated with the use of green tea infusions. J Hepatol., 44: 616-619.
18. **Federico A, Tiso A, Loguercio C (2007):** A case of hepatotoxicity caused by green tea. Free Radic Biol Med., 43(3): 474-84.
19. **Chalasani N, Bonkovsky H, Fontana R *et al.* (2015):** Features and outcomes of 899 patients with drug-induced liver injury: the DILIN prospective study. Gastroenterol., 148: 1340–1352.
20. **Semwal R, Semwal D, Vermaak I *et al.* (2015):** A comprehensive scientific overview of *Garcinia cambogia*. Fitoterapia, 102: 134–148.
21. **Rameshrad M, Hosseinzadeh H, Bedrood Z (2018):** Toxicological effects of Camellia sinensis (green tea). Phytother Res.,32: 1163-1180.
22. **Koshy A, Anila L, Vijayalakshmi N (2001):** Flavonoids from *Garcinia cambogia* lower lipid levels in hypercholesterolemic rats. Food Chem., 72:289–94.
23. **Roudebush P, Schoenherr W, Delaney S (2008):** An evidence-based review of the use of nutraceuticals and dietary supplementation for the management of obese and overweight pets. J Am Vet Med Assoc., 232: 1646-1655.
24. **Tadayon M, Movahedi S, Abedi P *et al.* (2018):** Impact of green tea extract on serum lipid of postmenopausal women: A randomized controlled trial. J Trad Complement Med., 8: 391-395.
25. **Walkowiak J, Bajerska J, Kargulewicz A *et al.* (2013):** Single dose of green tea extract decreases lipid digestion and absorption from a test meal in humans. Acta Biochim Pol., 60(3): 481-483.
26. **Suliburska J, Bogdanski P, Szulinska M *et al.* (2012):** Effects of green tea supplementation on elements, total antioxidants, lipids, and glucose values in the serum of obese patients. Biol Trace Elem Res., 149(3):315-322.
27. **Debetto P, Luciani S (1988):** Toxic effect of chromium on cellular metabolism. Sci Total Environ., 71:365–377.
28. **Baruthio F (1992):** Toxic effects of chromium and its compounds. Springer, 32: 145–153.
29. **Turner J (2011):** Glomerulonephritis therapy: is there a role for green tea? Kidney Int., 80: 563-564.
30. **Sahin K, Orhan C, Tuzcu M *et al.* (2010):** Epigallocatechin-3-gallate prevents lipid peroxidation and enhances antioxidant defense system via modulating hepatic nuclear transcription factors in heat-stressed quails. Poult Sci., 89: 2251-2258.
31. **Akpantah A, Oremosu A, Ajala M *et al.* (2003):** The effect of crude extract of Garcinia Kola seed on the histology and hormonal milieu of male Sprague-Dawley rats' reproductive organs. Niger J Health Biomed Sci., 2(1): 40-46.
32. **Adani V, Ahmad N, Mukhtar H (2013):** Molecular targets for green tea in prostate cancer prevention. J Nutr., 133: 2417–2424.
33. **Chandra A, Choudhury S, De N *et al.* (2011):** Effect of green tea (*Camellia sinensis* L.) extract on morphological and functional changes in adult male gonads of albino rats. Indian J Exp Biol., 49:689–97.
34. **Kao Y, Hiipaka R, Liao S (2000):** Modulation of endocrine systems and food intake by green tea epigallocatechin gallate. Endocrinol., 141:980–7.
35. **Figueiroa M, César Vieira J, Leite D *et al.* (2009):** Green tea polyphenols inhibit testosterone production in rat leydig cells. Asian J Androl., 11:362–370.
36. **Hornick J, Van Eenaeme C, Clinquart A *et al*. (2000):** Different periods of feed restriction before compensatory growth in Belgian blue bulls: I. animal performance, nitrogen balance, meat characteristics, and fat composition. J Anim Sci., 76: 249-259.
37. **Heymsfield S, Allison D, Vasselli J *et al.* (1998):** *Garcinia cambogia* (Hydroxycitric Acid) as a Potential Antiobesity Agent. A Randomized Controlled Trial. Am Med Associat., 280: 1596-1600.